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USSR Report

LIFE SCIENCES

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USSR REPORT

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BIOMEDICAL AND BEHAVIORAL SCIENCES

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UDC 612.18 + 612.178

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Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 2, Mar-Apr 85
(manuscript received 13 Dec 83) pp 185-191

PALETS, B. L., POPOV, A. A., TIKHONOV, M. A. and ARKHANGEL'SKIY, D. Yu.,
Institute of Cybernetics, UkSSR Academy of Sciences, Kiev

[Abstract] Studies of the regulation of blood circulation during orthostatic effects and gravitational overloads on the human body grew in importance because of the fast developments in space medicine. A mathematical model for baroreflector regulation of human blood circulation was developed with consideration of the force of gravity and the theoretical data were compared with human results obtained in experiments with increasing gravitational overloads searching for the limits of tolerance. This model appeared to be adequate for application in medical and technological situations. Further refinement could be achieved in the area of a more detailed description of the hemodynamics of central blood circulating regions in which the regulatory processes occur, determining the functional capacity of blood circulation by regulating changes in the central blood volume. The role of active venomotor reactions was found to be relatively insignificant. Figures 4; references 11: 9 Russian, 2 Western.
[1944-7813]

UDC 612.014.2:613.641

STUDY OF HYPOKINESIA AND ACCELERATION EFFECTS ON HUMAN CHROMOSOMES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 2, Mar-Apr 85
(manuscript received 20 Mar 84) pp 300-302

BOBKOVA, N. N., Moscow

[Abstract] A thirty-day antiorthostatic hypokinesia with an -8° angle to horizontal position followed by laterally-directed 8 g accelerations for 40 s did not lead to any chromosomal damage in peripheral blood lymphocytes of adult subjects with atherosclerosis and vegetative vascular dystonia. References 26: 16 Russian (1 by Western author), 10 Western.
[1944-7813]

AGROTECHNOLOGY

UDC 633/635:631.8(479-25)

AGRICULTURAL SCIENCE IN ARMENIA AND FOOD PROGRAM

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian Vol 38, No 4, Apr 85 (manuscript received 18 Jan 85) pp 284-290

ASTVATSATRYAN, B. N., Agricultural Institute, ArSSR Ministry of Agriculture

[Abstract] Armenia is known for the wide range of climate-soil variations existing close to each other which makes it difficult to develop an overall plan for proper utilization of the resources. One of the proposed measures for improvement in this situation is based on crop rotation. Other attempts in the past concentrated on development of new brands with higher yield and faster ripening. For the 13th Five Year Plan, the following measures are proposed: expansion of arable soil to eroded areas, to semidesert stony soils and salty ground; introduction of improved crop rotation system; increasing the area of irrigated soils by the use of rotational, progressive irrigation methods; higher use of fertilizers based on scientific evaluation of specific needs; introduction of novel, highly productive brands of grain, feed, vegetable and potato cultures, and programming the harvests of principal field cultures and introduction of mathematical modelling of stable high yield crops. [1935-7813]

UDC 547.964.4.057:615.276.4:577.322.7'112.825

IMMUNOPOIETIN SYNTHESIS: NOVEL LOW-MW FRAGMENTS OF IgG, IgM, IgE and IgA

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 4, Apr 85
(manuscript received 15 Aug 84; in final form 5 Nov 84) pp 437-446

CHIPENS, G. I., ANTSANS, Yu. Ye., ZARINSH, P. P. and OSIS, L. P., Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga

[Abstract] The structural similarity between IgG fragment (345-349) and thymopentine led to the synthesis and biological study of analogous peptides obtained from IgG and other immunoglobulin classes (IgM, IgE, IgA). The essential synthetic approach consisted of limited proteolysis leading to the appearance of free amino and carboxyl groups, which on reaction with functional peptide side groups led to intramolecular quasicyclization. The novel peptides, designated as immunopoietins with putative immunoregulatory functions, were identified as IPG-5 (IgG-(345-349), glu-pro-gln-val-tyr), IPM-5 (IgM-(451-455), arg-pro-asp-val-tyr), IPA-5 (IgA-(347-351), arg-pro-glu-val-his) and IPE-6 (IgE-(430-435), ala-ala-pro-glu-val-tyr). Preliminary assessment in E-rosette formation demonstrated that IPG-5 and IPM-5 possessed activities similar to those of thymopentine TP-5 and levamisole with respect to human T lymphocytes with elevated or depressed activity, but little effect on 'normal' T cells. Further studies with quasicyclic peptides (involving interaction of amino acids in positions 1 and 3) should contribute additional information on the immunoregulatory role of such immunoglobulin-derived peptides. Figures 4; references 14: 7 Russian, 7 Western.
[1952-12172]

UDC 577.113.6:577.152.31*27'17

STEP-WISE OLIGONUCLEOTIDE SYNTHESIS. PART 23. IMMOBILIZATION AND ACTIVITY OF RNAses T_1 AND T_2

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 4, Apr 85
(manuscript received 27 Jul 84; in final form 23 Nov 84) pp 508-515

SOBOLEVA, I. A., KHABAROVA, M. I. and ZHENODAROVA, S. M., Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] Comparative studies were conducted on low-specificity (T_2) and guanyl-specific (T_1) RNAses from Aspergillus oryzae to assess enzymatic activity

vis-a-vis immobilization. Covalent immobilization on CM-cellulose had virtually no effect on the catalytic activity. T_2 (EC 3.1.27.1) retained its low level of activity and bound poorly to CM-cellulose azide groups due to the presence of 23 lys moieties per T_2 molecule; less than 1% of the native activity was bound to the carrier. Firm binding was obtained in the case of T_1 (1 lys moiety; EC 3.1.27.3) with retention of high levels of specific activity. The immobilized T_1 was found suitable for repeated use, whether packed into columns or layered over a sintered glass filter through which the substrates were percolated. Figures 3; references 14: 7 Russian, 7 Western.
[1952-12172]

UDC 577.114.5+579.841.11

ANTIGENIC BACTERIAL POLYSACCHARIDES. PART 13. STRUCTURE OF O-SPECIFIC POLYSACCHARIDE CHAIN OF PSEUDOMONAS CEPACIA IMV-4137 LPS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 4, Apr 85
(manuscript received 4 Oct 84) pp 536-538

KNIREL, Yu. A., DMITRIYEV, B. A., KOCHETKOV, N. K., TANATAR*, N. V. and ZAKHAROVA*, I. Ya., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow; *Institute of Microbiology and Virology imeni D. K. Zabolotnyy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Structural studies were conducted on the O-specific polysaccharide of Pseudomonas cepacia IMV-4137 by subjecting the LPS fraction to mild acid digestion with 1% acetic acid to remove the lipid component, and subsequent isolation of the polysaccharide moiety via gel filtration on Sephadex G-50. Chemical and antigenic analysis showed the latter to contain L-rhamnose and D-galactose. Detailed ^{1}H and ^{13}C-NMR spectroscopy and methylation analysis indicated that the polysaccharide consists of repeating disaccharide units with the following configuration: →2)-α-L-rhap-(1→4)-α- D-Galp-(1→.
References 14: 8 Russian, 6 Western.
[1952-12172]

UDC 577.114.012.7

THEORETICAL CONFORMATIONAL ANALYSIS OF REPEATING TETRASACCHARIDE UNITS OF SHIGELLA FLEXNERI O-ANTIGEN

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 4, Apr 85
(manuscript received 29 Jun 84; in final form 23 Nov 84) pp 539-549

LIPKIND, G. M. and KOCHETKOV, N. K., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] A theoretical conformational analysis was conducted on four repeating tetrasaccharide units representing the O-antigen of Shigella flexneri, based on calculation of the free energies of optimal conformation. Analysis of

the steric characteristics among the units along the polysaccharide chain included the contributions made by conformational state of the end disaccharides to the conformation of the central segments. The oligosaccharide fragments were found to be conformationally labile, as a result of which it was determined that calculation of entropy factors makes a significant contribution to structural assessment. On the basis of the energy data, it appears that gauche disaccharide conformers account for 70-90% of the equilibrium conformation, and T conformers account for 10-15%. Figures 3; references 31: 5 Russian, 26 Western.
[1952-12172]

UDC 547.963.32.057:577.152.64*12.042

ORGANOPHOSPHORUS ANALOGS OF BIOACTIVE COMPOUNDS. PART 14. HALOPHOSPHONATE ANALOGS OF ATP AS INHIBITORS OF AcCoA CARBOXYLASE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 5, May 85
(manuscript received 25 Apr 84; in final form 29 Nov 84) pp 598-604

BIRYUKOV, A. I., TARUSOVA, N. B., AMONTOV, S. G., OSIPOVA, T. I., GORYACHENKOVA, Ye. V. and RABINKOV*, A. G., Institute of Molecular Biology, USSR Academy of Sciences, Moscow; *Scientific Research Institute for Biological Testing of Chemicals, Kupavna, Moscow Oblast

[Abstract] A variety of halophosphonate derivatives of ATP--pp[CHBr]pA and p[CHBr]ppA--were synthesized via bromomethylene dihphosphonate and adenosine derivatives and tested for inhibition of AcCoA carboxylase (EC 6.4.1.2) derived from rat liver. The congeners were found effective reversible inhibitors of the enzyme with a K_i of 0.2 mM, exceeding in effectiveness other ATP derivatives such as phosphonates and imido compounds. However, in terms of rabbit heart AcCoA synthetase (EC 6.2.1.1) the inhibitory efficiency of the bromophosphonate ATP analogs did not differ significantly from that of the other congeners. Figures 1; references 17: 3 Russian, 14 Western.
[1954-12172]

UDC 547.458.412.3.057:579.842.15.084.3

SYNTHESIS OF OLIGOSACCHARIDE FRAGMENTS OF SHIGELLA FLEXNERI O-SPECIFIC POLYSACCHARIDES. PART 3. SYNTHESIS OF TETRA- AND PENTASACCHARIDES Glcα1-3Rhaα1-2(Glcα1-3)Rhaα1-OMe(I) AND GlcNacβ1-2(Glcα1-3)Rhaα1-2(Glcα1-3)-Rhaα1-OMe (II)

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 5, May 85
(manuscript received 29 Nov 84) pp 655-661

BAKINOVSKIY, L. V., GOMTSYAN, A. R., BAYRAMOVA, N. E. and KOCHETKOV, N.K., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] The tetra- and pentasaccharides I and II, representing fragments of the O-specific polysaccharide of Shigella flexneri serotype 5b were synthesized by

two approaches. In one synthetic approach the sequence was commenced by selective acylation of rhamonose residues with free hydroxyl groups at C-2 and C-3, and removal of the acetyl groups. The C-4 hydroxyl group in rhamonose and all the glucose hydroxyl groups were protected by benzoyl groups. Step-wise growth of the carbon chain resulted in a variety of oligosaccharide fragments; derivatives of the latter served as precursors for larger fragments. Another approach utilized the methodology of Wessel and Bundle, relying on different combinations of protective groups (Wessel, H.-P. and Bundle, Dr. R.,, Abstracts of the 12th Internatl. Carbohydrate Symp., Utrecht, The Netherlands, 1984, p. 93). References 9: 5 Russian, 4 Western.
[1954-12172]

UDC 547.458.34.057

SYNTHETIC HYDROCARBON ANTIGENS: CONJUGATION OF Le^a TRISACCHARIDE WITH POLYMERS IN, OLIGOSACCHARIDE→GLYCOSYLATED SPACER→ANTIGEN SCHEME

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 5, May 85 (manuscript received 23 Oct 84) pp 662-670

BOVIN, N. V., IVANOVA, I. A. and KHORLIN, A. Ya., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] The Fucα1-4(Galβ1-3)GlcNa trisaccharide of the Le^a blood group was synthesized by selective beta-galactosylation of benzyl-2-acetamido-6-O-acetyl-2-deoxy-alpha-D-glucopyranoside with acetobromogalactose to yield benzyl-2-acetamido-6-O-acetyl-3-O-(2,3,4,6-tetra-O-acetyl-beta-D-galactopyranosyl)-2-deoxy-alpha-D-glucopyranoside. α-Fucosylation of the latter disaccharide by diphenylcyclopropenyl or bromide-ion catalysis yielded the protected Le^a trisaccharide. Following removal of the protective groups and acetylation, the trisaccharide acetate was converted into acetylated oxazoline derivative which was used for glycosylation of 3-(trifluoroacetamido) propanol. The product then underwent deacetylation and formation of beta-[3-(trifluoro-acetamido)propyl]trioside. The latter product in turn was transformed into glycosides containing the Le^a trisaccharides linked to spacers with amino, azidocarbonyl or N-acryloyl groups. Conjugation of the latter products with BSA, cytochrome or acrylamide created synthetic Le^a antigens that elicited specific IgG antibodies in experimental animals. References 32: 10 Russian, 22 Western.
[1954-12172]

UDC 547.458.34:57.083.3

IMMOBILIZATION OF Le^a TRISACCHARIDE AND MURAMOYLDIPEPTIDE ON POLYACRYLAMIDE: INCORPORATION OF ADJUVANT INTO SYNTHETIC CARBOHYDRATE ANTIGENS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 5, May 85
(manuscript received 23 Oct 84) pp 671-673

KHORLIN, A. Ya. and BOVIN, N. V., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Studies were conducted on the feasibility of synthesis of synthetic carbohydrate antigens incorporating the adjuvant component in the polymeric molecule. In one case acrylamide was copolymerized with beta-[3-(acrylamido)-propyl glycoside of the Le^a trisaccharide in molar ratios of 15: 1 and 74:1. In the other case copolymerization involved the Le^a trisaccharide, N^1-(N-acetylmuramoyl-L-alanyl-D-isoglutaminyl)-N^6acryloylhexamethylenediamine, and acrylamide in 1:1:54 ratio. In both cases water-soluble polymers were obtained with a degree of polymerization on the order of 10^3, with retention of reactant mixture molar ratios. The approach was, therefore, found to be useful for the preparation of high-MW carbohydrate antigens with defined molar ratios of the various components. References 10: 5 Russian, 5 Western.
[1954-12172]

UDC 577.112.5:543.31

FORMATION OF QUASIMOLECULAR ION BEAMS OF PEPTIDES IN SOLUTIONS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 5, May 85
(manuscript received 14 Jun 84; after revision 29 Oct 84) pp 700-704

ALEKSANDROV*, M. L., BARAM, G. I., GALL*, L. N., KRASNOV*, N. V., KUSNER, Yu.S., MIRGORODSKAYA**, O. A., NIKOLAYEV*, V. I. and SHKUROV*, V. A., Novosibirsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences (AS), Novosibirsk; *Institute of Analytical Instrumentation, USSR AS, Leningrad; **All-Union Scientific Research Technological Institute of Antibiotics and Medically Useful Enzymes, Leningrad

[Abstract] Problems in mass-spectrometric analysis of biomolecules have led to the development of soft-ionization techniques. Presently, this approach is expanded to take advantage of the fact that biomolecules in solution exist as ions to a certain extent, and that mass-spectrometry can be applied to such quasimolecular ions without additional physical methods of ionization. Mathematical treatment is accorded to a capillary system to which a current is applied, resulting in the dispersion of the biomolecular solution into microdroplets or clusters of quasimolecular ions. On contact with a carrier gas flowing with a defined velocity at a given temperature, the droplets vaporize to form beams of quasimolecular ions that are directed to a mass-spectrometer. Comparative spectral patterns are provided for bradykinin obtained by this approach, as well as by field desorption and fast atom bombardment.
Figures 3; references 7: 4 Russian, 3 Western.
[1954-12172]

UDC 616.155.18:577.115:547.953

EFFECTS OF AQUEOUS PHOSPHOLIPID DISPERSIONS ON NONSPECIFIC AND IMMUNE HEMOLYSIS OF ERYTHROCYTES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 4, Apr 85
(manuscript received 29 May 84) pp 341-348

IVANOVA*, N. N., VASILENKO**, I. A., KAPLUN**, A. P., SENNIKOV*, G. A., BOROVYAGIN***, V. L. and SHVETS**, V. I., *Kharkov Association for Production of Bacterial Preparations, USSR Ministry of Health; **Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov; ***Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] Aqueous phospholipid dispersions (PD) obtained from bovine brain were tested for their effects on immune and nonspecific hemolysis of SRBC, to determine the mechanism of protective action. Both sonicated (5 min) and unsonicated PDs (60% phosphatidylethanolamine, 30% phosphatidylcholine + sphingomyelin, 10% cerebrosides) resulted in 100% inhibition of immune hemolysis using rabbit anti-SRBC antibodies and commercial complement. In the system employing bee venom as the lytic agent 100% protection was obtained only with the sonicated PD, in particular with preparations supplemented with 2% dicetyl phosphate, whereas 20-30% lysis was seen with the unsonicated PD. The protective effects were predicated on two major factors, one consisting of binding to the erythrocyte membrane and increasing its stability, and the other to direct binding and inactivation of the lytic agents, including complement. The protective effects were essentially due to the plasmalogen fraction of PD, especially phosphatidylethanolamine. Figures 7; references 22: 12 Russian. 10 Western.
[373-12172]

ATROPINE-INACTIVATING BLOOD PROTEIN

Moscow BIOKHIMIYA in Russian Vol 50, No 4, Apr 85
(manuscript received 18 Apr 84) pp 576-580

YEVDOKIMOV, L. D. and YELAEV, N. R., Institute of Toxicology, USSR Ministry of Health, Leningrad; Department of Biological Chemistry, Petrozavodsk State University

[Abstract] A xenobiotic-inactivating hemoprotein was isolated from rat blood and purified 750-fold by ammonium sulfate fractionation, DEAE-cellulose chromatography and gel filtration on Sephadex G-75. The content of the atropine-inactivating protein in blood increased 2-3-fold when atropine was repeatedly administered to the animals. The molecular weight of the protein is 73,000-80,000 daltons. The protein is capable of inactivating other cholinolytics with structures differing from that of atropine, such as glypin and amizyl. However, it shows the greatest affinity for substrates in which the nitrogen of the alcohol moiety of the ester is located in a ring structure [atropine and glypin]. The atropine-inactivating protein comprises

approximately 0.1% of total blood protein. Based on studies of the rate of atropine inactivation as a function of its concentration, atropine administered to an intact animal in a toxic dose [50 mg/kg] could potentially be inactivated after 5 hours.

UDC 541.128

MODELING OF BIOLOGICAL CATALYSTS

Moscow USPEKHI KHIMII in Russian Vol 54, No 5, May 85 pp 786-802

PURMAL', A. P. and NIKOLAYEV, L. A., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] It is noted that any model could represent one or another characteristic of an original enzyme system. If high catalytic activity could be considered as characteristic of enzymes, then colloidal solutions of metals could be used as the first models. The first enzyme modeled was catalase, responsible for the breakdown of hydrogen perioxide in living cells. A historical review of papers concerned with modeling of biological catalysts is reported with special attention to various pioneering studies which led to new concepts, new developments or hypotheses and yielded important results applicable to everyday practice. The following subheadings are covered: first models of metal enzymes; metal complexes as models of active groups; models of non-metallic active enzyme groups; studies of metal complexes as models for catalase and nitrogenase; models of oxidases, oxygenases and other enzymes; enzyme modeling leading to new catalysts; the role of the high molecular weight portion in model systems and that of protein in enzymes. References 124: 79 Russian (10 by Western authors), 45 Western (9 by Russian authors).
[1932-7813]

BIOPHYSICS

UDC 577.3

MECHANISMS OF Ca^{+2}-DEPENDENT COMPETENCE IN BACTERIA: FORMATION OF NONBILAYER STRUCTURES IN E. COLI CELLS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 282, No 3, May 85
(manuscript received 20 Dec 84) pp 724-728

SAFELNIKOV, A. G., IL'YASHENKO, B. N., CHUPIN, V. V., VASILENKO, I. A. and YEVSTIGNEYEVA, R. P., corresponding member, USSR Academy of Sciences, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] The mechanism of the increased permeability to DNA observed in E. coli cells subjected to thermal shock in the presence of high concentrations of Ca^{+2} ions was studied using ^{31}P-NMR. Addition of Ca^{+2} to E. coli cells increased the isotropic signal observed in the ^{31}P-NMR, as did addition of Mg^{+2}. When the cells were incubated with Ca^{+2} at 0° for 1-2 hours and then brought quickly to 42°, a new downfield maximum appeared in the spectrum. Selective saturation of this signal resulted in partial transfer to the isotropic signal. The data suggest that Ca^{+2} caused the formation of nonbilayer lipid structures with isotropic molecular movement in the bilayer and exchange between these lipid molecules and those responsible for the new signal, the nonbilayer molecules. Analogous changes were not seen with Mg^{+2} incubation. The intensity of the new ^{31}P-NMR signal increased with duration of incubation, while anisotropy and cellular viability decreased. Addition of EDTA counteracted the effect. Incubation with Ca^{+2} at $4-8^{\circ}$ did not produce the new signal. The formation of nonbilayer lipid structures is one way in which exogenous DNA can be transported into an E. coli cell during Ca^{+2}-dependent transfection and transformation. Figures 3; references 15: 2 Russian, 13 Western.
[1910-12126]

UDC 612.83

RELATION OF LIGHT SENSITIVITY OF RETINAL RODS TO METABOLISM OF CYCLIC NUCLEOTIDES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85
(manuscript received 30 Mar 84) pp 159-161

BOCHKIN, L. M., ZAK, P. P. and OSTROVSKIY, M. A., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Isolated frog and rat retinas were used to study the effect of phosphodiesterase inhibitors on electrical activity of the rods. Phosphodiesterase inhibitors (papaverine and isobutylxanthine) were used in the experiments. Overall receptor potential, isolated with the aid of sodium aspartate (20 mM), was recorded transretinally. Qualitative similarity between the effect of phosphodiesterase inhibitors and natural adaptation to the dark indicates that the cyclic nucleotides metabolism system plays an important role in adaptation of the rods. It was assumed that sensitivity of the rods is connected with the level of cyclic nucleotides which is maximal in the dark but drops during adaptation to light. There is the possibility that drugs such as papaverine and theophylline and others used extensively in clinical practice may affect sensitivity to light and lower the threshold of visual perception of man. Figures 4; references 6: 3 Russian, 3 Western.
[1943-2791]

UDC 577.322.4:547.963.4

ORIENTATION OF ALPHA-HELICAL SEGMENTS IN BACTERIORHODOPSIN AND BACTERIOOPSIN

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 4, Apr 85
(manuscript received 5 Nov 84) pp 363-366

ALDASHEV, A. A., Kirghiz Scientific Research Institute of Cardiology, Frunze

[Abstract] Linear IR dichroism was employed in a study of the orientation of the alpha-helical segments in Halobacterium halobium rhodopsin and opsin. In rhodopsin the alpha-helical segments are almost perpendicular to the plane of the membrane, whereas in opsin the angle between the axis of the alpha-helix and the normal to the plane approaches $48 \pm 6^{\circ}$. The data supported the contention that photo-induced hydroxylaminolysis of the aldiminic bond alters the angle of the alphahelical rods in the chromophoric site of bacteriorhodopsin, pointing thereby to the importance of specific polyene-protein interactions in determining the spatial configuration of bacteriorhodopsin. Retinal may, therefore, function as an anchor to fix bacteriorhodopsin into a compact molecule, leading to the almost perpendicular orientation of the alpha-helical segments to its plane. Figures 4; references 10: 2 Russian, 8 Western.
[373-12172]

UDC 577.352.464:541.135.4

ANALYSIS OF UNILINEAR DIFFUSION MODELS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 4, Apr 85
(manuscript received 19 Oct 84) pp 411-425

AYT'YAN, S. Kh. and PORTNOV, V. I., Institute of Electrochemistry imeni A. N. Frumkin, USSR Academy of Sciences, Moscow

[Abstract] A physical model was devised to serve for mathematical analysis of unilinear diffusion, consisting of a channel with equipotential cells or hollows (n) that could accommodate one diffusing particle. In the basic model considered, one type of particles (A) were located on one side of the channel opening, and other type (B) on the other opening. Detailed mathematical approximations for the rate of diffusion are presented and computer-based calculations provided for theoretical and experimental translocation of the particles. Unilinear diffusion was calculated for low-level filling of the cells, intermediate degrees of filling, and high degrees of occupancy by the translocated particles. A divider technique was employed to describe diffusion of the two particle types in cases of high degree of occupancy, which made it possible to account for the exponential plots of the partial correlation function $F^{AB}_{n,n+1}$. An uncoupling approximation was employed to solve the differential equation for the correlation function. Figures 6; references 9: 2 Russian, 7 Western.
[373-12172]

UDC 577.352.24

LIGHT DISPERSION STUDY ON EFFECT OF INCUBATION CONDITIONS ON SIZE DISTRIBUTION OF TOTAL-LIPID LIPOSOMES OF ESCHERICHIA COLI

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 4, Apr 85
(manuscript received 6 Apr 84; in final form 8 Jun 84) pp 376-382

LEBEDEV, A. D., CHERNYAVSKIY, V. A. and SHARONOV, B. P., All-Union Scientific Research Institute of Highly Purified Biopreparations, Leningrad

[Abstract] Optical shift spectroscopy was employed to assess size distribution, with time, of total-lipid liposomes prepared by ultrasonication from E. coli M-17. Time-course study in tris-HCl buffer, pH 8.0, demonstrated the formation of vesicles with a mean radius of ca. 400 Å; after 6 h of incubation at 37°C the distribution pattern became bimodal with two peaks at about 300 and 900 Å. After 12 h of incubation, the distribution again became continuous and did not change significantly over a 100 h period of observation, with the exception that the 'large-size' end became somewhat more elongated as a result of slow aggregation. Incubation of the newly-formed liposomes with Ca^{++} for 6 h increased the mean radius of the vesicles to ca. 1100 Å. Addition of both EGTA and Ca^{++} accelerated Ca-induced fusion and the formation of liposomes with

a mean radius of ca. 1500 Å within 10-15 min. The effects of EGTA were ascribed to its firm binding to the lipid membranes and firm chelation of Ca^{++}, thereby increasing the local concentration of Ca^{++}, which accelerated fusion of the liposomes. Figures 4; references 19: 6 Russian, 13 Western.
[373-12172]

UDC 547.963.4:577.352.465

PROTON TRANSLOCATION NOT AFFECTED BY C-TERMINAL REGION OF BACTERIORHODOPSIN

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 5, May 85
(manuscript received 9 Jan 85) pp 453-459

ABDULAYEV, N. G., KISELEV, A. V., OVCHINNIKOV, Yu. A., DRACHEV*, L. A., KAULEN*, A. D. and SKULACHEV*, V. P., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow; *Interfaculty Scientific Research Problems Laboratory of Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy, Moscow State University imeni M. V. Lomonosov

[Abstract] In view of some reports that removal of the 17 amino acid C-terminal region of bacteriorhodopsin may affect proton translocation, studies were conducted on Halobacterium halobium purple membranes to define the effects of such a molecular lesion induced by papain on the rate of formation and relaxation of the intermediate M_{412} component, photoelectric responses in the "colloid film--purple membrane" system, and light induced changes in pH (measured with p-nitrophenol). Papain-treated purple membranes subjected to a laser pulse (532 nm, 15 nsec halftime, 50 mJ) responded with significantly less change in pH than control membranes. However, the former recovered a normal level of response when subjected to ultrasonication, indicating that diminished proton translocation was due to greater aggregation rather than the loss of C-terminal amino acids. M_{412} relaxation of papain-treated membranes was somewhat shorter than of control membranes (3 and 4 msec halftimes, respectively). Both membrane preparations responded with similar photopotentials in a phospholipid colloid film (130-150 mV for 400 nm light stimulus; 40-50 mV or laser pulse). Furthermore, in the case of both membrane preparations the response consisted of the three standard phases: negative, microsecond and millisecond. The present data indicate that the 17 amino acid C-terminal segment of bacteriorhodopsin is nonessential with regard to proton translocation. Figures 3; references 23: 7 Russian, 16 Western.
[375-12172]

UDC 547.963.4:543.424:577.332

MICROENVIRONMENT OF RETINAL SCHIFF'S BASE IN BACTERIORHODOPSIN

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 5, May 85
(manuscript received 27 Nov 84) pp 460-469

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[Abstract] Quantum chemical CNDO/S-CI calculations and Raman spectroscopy were employed in an assessment of point charge distribution around protonated retinal Schiff's base in Halobacterium halobium rhodopsin. The study yielded a new model which, in distinction to Honig-Nakanishi model, does not require a negative point charge in the vicinity of the $C_5=C_6$ bond, and accounts with considerable accuracy for the spectral changes accompanying the bacteriorhodopsin cycle. The proposed model includes the tyrosine moiety closest to the Schiff's base group which forms a hydrogen bond with a carboxyl group; the oxygen atoms of the latter group are located over the protonated Schiff's group and 2.5-3.0 Å above the plane of the rest of the retinal molecule. This carboxyl group serves as a counterion to the protonated base, with the bathochromic shift (460→570 nm) of bacteriorhodopsin in solution relative to the protonated base ascribed to the effective charge on tyrosine hydroxyl group, located 2.0-3.0 Å from the carboxyl group oxygen and 2.8-3.5 Å from the plane of the retinal molecule. This model provides adequate accounting for the BRh570, K610, L550 and M_{412} spectral forms of bacteriorhodopsin. Figures 4; references 44: 5 Russian, 39 Western.
[375-12172]

UDC 670.73

INTERACTION OF Ca^{++}-LOADED LIPOSOMES WITH VASCULAR SMOOTH MUSCLE

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 5, May 85
(manuscript received 7 Jan 85) pp 470-476

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[Abstract] Electrophysiological studies were conducted with rat portal vein smooth muscle to determine the feasibility of calcium delivery to such target cells via calcium-loaded liposomes. In vitro studies with vascular smooth muscle segments in calcium-free medium demonstrated that loaded (2 mN Ca^{++}) lecithin:stearoylamine (7:3) and lecithin:dicetyl phosphate (7:3) liposomes were capable of providing the muscles with sufficient calcium levels for contractile function and maintenance of isometric tone. Transfer of calcium from the liposomes to the cells occurred both through rapid potential-dependent calcium channels, as well as through direct fusion of the liposomes with the cell membrane. Figures 5; references 13: 2 Russian, 11 Western.
[375-12172]

UDC 577.336

MEASUREMENT OF RICIN B SUBUNIT-BURKITT'S LYMPHOMA CELL INTERACTION BY FLUORESCENCE POLARIZATION USING LIPID-SPECIFIC FLUORESCENT LABELS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 5, May 85
(manuscript received 7 Sep 84; in final form 23 Jan 85) pp 477-482

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[Abstract] A study was conducted of the applicability of fluorescence polarization (FP) as a technique for measuring ligand-receptor interaction, using as a test system the binding of ricin B subunit to Burkitt's lymphoma EB-3 cells prelabeled with lipid-specific fluorescent probes (anthrylvinyl labeled phosphatidylcholine or spinigomyelin). The cells were labeled by incubation with alcoholic solutions for 3 h at 36.5°C. Analysis of the binding data showed that binding of the B subunit by cellular glycoprotein receptors induced conformational perturbations affecting the lipid component of the cell membrane that was measurable by FP. On the basis of binding data analyzed by double logarithmic plots, the K_d for the binding of the ricin subunit to the receptor was 0.5×10^{-11}M, and led to the calculation of ca. 2×10^4 specific receptors per EB-3 cell. The FP method made possible the detection of the binding of a single B molecule to the cell, a sensitivity not achieved with standard radioimmunoassay techniques utilizing radiolabeled ricin B subunit. Figures 4; references 11: 4 Russian, 7 Western.
[475-12172]

UDC 543.426:577.352.335

NOVEL APPROACH TO BIOLOGICAL SIGNAL AMPLIFICATION

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 5, May 85
(manuscript received 17 Jan 85) pp 483-486

BERGEL'SON, L. D., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Lipid-specific fluorescent probes were used to illustrate a novel approach to a better understanding of signal amplification in biological systems, which relied on the transmission of perturbation in an adjacent protein or glycoprotein moiety to a metastable lipid moiety. The approach avoids the complexities of an enzyme cascade for information transfer and signal amplification, and takes advantage of the lipid components in various biomolecules and biological structures. Thus, addition of subphysiological concentration of $PG\text{-}E_1$ to a suspension of high-density lipoproteins (HDLP) previously labeled with a lipid-specific fluorescent probe does not result in the formation of a stable $PG\text{-}E_1$/HDLP complex, yet leads to fluorescence polarization (FP).

Although the reaction of the prostaglandin with the apoprotein is nonspecific, the binding of one PG-E_1 molecule per 10^3 to 10^4 HDLP molecules is sufficient to induce FP. The latter phenomenon is ascribed to the slow relaxation of the phospholipid component of HDLP induced by the effector (PG-E_1). A mechanism such as this may account for the fact that PG-E_1, in concentrations as low as 0.1-1 per cell, are known to induce profound cellular effects. Figures 3; references 11: 6 Russian, 5 Western.
[375-12172]

ROMANIAN PLANT PRODUCES PROTEIN CONCENTRATE FROM PARAFFIN-NOURISHED YEASTS

Riga NAUKA I TEKHNIKA in Russian No 6, May 85 pp 28-29

[Article: "Biology Plant"]

[Text] The time will soon come when we shall learn how to transform petroleum directly into a ... roast. But we already know how to produce proteins -- the "building blocks" of living matter -- from products of this fossil fuel.

One of the world's few factories in which proteins are produced by continuous biotechnology is located in Romania, in the city of Curtea-de-Arges. Here, at the bioproteins plant, microorganisms are converted into a "flour" which contains a protein concentrate that is so essential to the fattening of swine, cattle, sheep, fowl, and fish. These microorganisms are Candida type yeasts. The culture medium in which they are grown contains sulfates and phosphates. Paraffin, a petroleum product, supplies the carbon that is essential to the microorganisms' viability.

The production process begins in the test tube. Several million microorganisms live in this small vessel. The laboratory technician collects a trace amount of the culture and places it into a flask which is agitated on a special apparatus. The yeasts start to grow. They are then passed through a laboratory fermenter with a culture medium, and later placed into semicommercial fermenters 20 meters in height. From there they are placed into full-scale commercial fermenters of even more impressive dimensions. During all of this time the microorganisms grow and multiply continuously. Within a period of 100 hours a drop taken from a test tube attains a mass of 300 kilograms (dry weight).

There are hardly any people to be seen in the plant's shops. All of the processes are automated. Everything in the plant is sterile, like in a pharmacy. The sterilization process includes all of the units and pipes which carry the mixture of nutrients and yeasts, the water, and even the air that is essential to the microorganisms' viability.

The living cells that are produced are then crushed, dried, and converted into a fine cream-colored powder that contains 58 percent of unicellular proteins. The rest is composed of vitamins (mainly of the Vitamin B group), fats, etc. After this, the product is packaged and sent to the consumers.

The plant sends approximately 60,000 tons of this protein product to cattle breeding farms annually. One should say that the unicellular proteins are almost completely assimilated by the animals in the same way that the human body assimilates bee honey. For example, swine that are fattened the usual way attain a weight of 110 kilograms in six months. If a small amount of these proteins is added to the feed, however, the swine will gain an additional 20 kilograms. The best results have been obtained in the feeding of fish, poultry, lamb, calves, and swine. Successful experiments have also been completed on egg-laying hens and sows.

The cost of the protein supplements pays for itself by the increase in the livestock production.

Specialists at the plant, together with the collective at the Bucharest Scientific-Research Pharmaceutical Chemistry Institute, have embarked upon exceptionally important research whose purpose is to develop the technology to produce proteins, not from normal paraffin, but from methanol, which is significantly cheaper. The changeover to the new technology will require almost no changes in equipment.

6289
CSO: 1840/1958

BIOTECHNOLOGY: SCIENCE AND PRACTICE

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 25 Jun 85 p 3

[Article by A. Ilyaletdinov, director of the Microbiology and Virology Institute, academician of the Kazakh SSR Academy of Sciences]

[Text] The All-Union Microbiology Society's 7th congress convenes today in Alma-Ata.

Participants in the congress will discuss a broad range of matters connected with the development of scientific research and the introduction of biotechnology's achievements into production. Prominent Soviet scientists, heading major branches of microbiological science, are taking part in the work of the congress: Academicians G. K. Skryabin and Ye. N. Mishutin, USSR Academy of Sciences Corresponding Members M. V. Ivanov, Ye. N. Kondratyeva and G. A. Zavarzin, and USSR Academy of Medical Sciences Academician I. N. Blokhina.

A process of constant forward motion operates in the science. By comparison with the time of the society's previous congresses, held in Yerevan and Riga, the level of fundamental research now has risen markedly, and the science's link to practical application has become closer. Microbiology, as a scientific discipline, was founded by the works of the eminent scientists, L. Pasteur and S. N. Vinogradskiy. A prolonged process of gathering knowledge about the very smallest living creatures, invisible to the naked eye, went on for a long time. During recent decades, a qualitative leap has taken place in this science, applied solutions have been embodied in new technological processes and new branches of industry have been created: An antibiotics industry, based upon the use of pure microorganism cultures under sterile conditions, and a microbiological industry, producing feed protein for animal husbandry and microbiological means for fighting agricultural pests.

The choice of Alma-Ata as the place to hold the congress bears witness to the rather high developmental level of this scientific discipline in our republic. Microbiology is developing successfully in a number of scientific research institutes and appropriate departments of higher educational institutions.

The problem areas of the Kazakh SSR Academy of Sciences Microbiology and Virology Institute are determined, to a considerable extent, by growth demands of the republic's economy. Scientific research is being carried out on a broad

front in the study of microorganism metabolism, in biosynthesis of physiologically active substances (antibiotics, enzymes) and in the technology of the new microbiological industries. The microorganisms isolated from nature often are unsuited to the technological demands of industry. Therefore, geneticists and selectionists are trying to enhance their useful properties. These tiny creatures are ubiquitous, they inhabit the soil, bodies of water and rocks, and the more we know about them the more extensively we can use them for our purposes.

In recent years, as the end result of lengthy development in a large number of scientific disciplines (biological, chemical, technical), a new field has taken shape in science and industry--biotechnology. Industrial microbiology serves as its core. Large-tonnage feed protein production from petroleum hydrocarbons has been organized in the country. However, the microbiological industry only partially meets farm livestock demands for protein. The need is arising to seek a technology feasible under farm conditions.

At present, producing the microbial biomass in small-capacity installations presents itself as a realistic means of solving the problem. Our institute has proposed a technology for culturing feed yeasts directly in feed shops by using media containing starch preliminarily subjected to fermentation with the malt of germinated grain--barley or other cereal grains. The method of fermenting starch-containing stock with malt amylase, essentially well-known in brewing beer, is turned into feed production. Special races of yeast, produced by our staff members, are used to obtain the feed protein. In the technological plan, these significantly surpass the yeasts used before in such indices as biomass accumulation and cellular protein content.

Microbiological science also has in its arsenal other technological solutions contributing to enhancement of the animal-husbandry feed base. Microbiological preservatives--dry bacterial ferments [zakvaski] for ensiling feeds--with broad application in agricultural production, help prevent nutrient loss and improve the quality of succulent [green] fodder.

Joint use of the ferments of propionic acid and lactic acid bacteria reduces the dry weight loss of corn silage to half as much, enriches it with vitamins and prevents souring of the fodder. The application of a dry bacterial ferment from a culture of amylolytic Streptococcus furthers the rapid accumulation of organic acids and, accordingly, the preservation of fodder for a short period of time, which prevents the loss of nutrients, primarily protein. This ferment permits preserving a legume and grass green mass in a wide range of humidities--even in the 60-70 percents, when dried hay, prepared according to the common technology, spoils.

Ferments from special strains of lactic acid and cellulose-decomposing microorganisms provide for obtaining from straw a succulent fodder, readily edible by livestock and with increased digestibility of the cellulose. The economic impact of using dry bacterial ferments in the republic's feed production amounted to 8.6 million rubles for four years of the five-year plan. Production of dry bacterial ferments for ensiling fodders has been organized at the Vyshnevolotskiy Ferment Preparations Plant.

The problems of microbiologically purifying industrial sewage enter into biotechnology's sphere of interests because modern purification works are biotechnological systems, in which microorganisms destroy highly toxic organic compounds, turning them into harmless substances simple in structure. Microbiological methods for purifying acetaldehyde-production effluent of highly toxic organic pollutants and heavy metals have been developed by our institute jointly with producers. A technology for purifying the effluent from nonferrous metallurgy plants of heavy metal ions and organic pollutants has been developed by the joint efforts of Kazakh SSR Academy of Sciences microbiologists and the production process design institute "Kazmekhanobr" ["Kazakh SSR Scientific Research Institute for Machining Commercial Minerals"]. The chief factors in the precipitation of metals in a water medium under biological pond conditions are their interactions with metabolites of the microorganisms, with the mineralization products of organic substances and with hydrogen sulfide of bacterial origin.

The work on microbiological leaching out of metals may serve as an example of using the activity of microorganisms for solving national economic problems. This work was carried out comprehensively by microbiologists, metallurgists and miners. New production-process schemes were developed for the bacterial leaching of copper, zinc, lead and arsenic out of Kazakhstan's sulfidic raw material.

Formerly a pure theoretical science, virology also is making its contribution to the development of biotechnology. One of the most important matters in virology is production of antiviral vaccines which will provide for warding off and treating various diseases. In particular, the development and use of effective anti-influenza vaccines remain the most important stage in the fight against this disease. The latest achievements in the area of studying the chemical and antigen structures of influenza viruses and the modern methods of molecular biology permit us to undertake development of so-called subunitary [subyedinichnyye] vaccines--more improved in composition and effectiveness. In this regard, a general-purpose technological method of isolating highly purified influenza virus glycoproteids has been obtained and protected by copyright jointly with the Kazakh SSR Academy of Sciences Chemical Sciences Institute at our institute. A technology for obtaining subunitary influenza vaccine is being developed jointly with the USSR AMN [Academy of Medical Sciences] Virology Institute imeni Ivanovskiy.

Microbiology and virology are making a worthy contribution to the development of biological science and scientific and technical progress in the coun[illegible].

12319
CSO: 1840/1937

UDC 579.841.11.017.7

UTILIZATION OF 3-CHLOROBENZOIC ACID BY ACINETOBACTER CALCOACETICUS

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 2, Mar-Apr 85
(manuscript received 26 Aug 83) pp 203-208

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[Abstract] Studies were conducted on the metabolic pathways by which a strain of Acinetobacter calcoaceticus, isolated in Moscow Oblast, utilizes 3-chlorobenzoic acid as the sole source of carbon and energy. Oxidation of the substrate was found to yield 3-chloropyrocatechol and 4-chloropyrocatechol, with the latter serving as nutrient source for A. calcoaceticus. 3-Chloropyrocatechol is further oxidized to 2-chloro-cis, cis-muconic acid. The latter is not further metabolized and accumulates in the medium. On an overall basis, approximately 50-60% of the theoretically-possible concentration of chlorine is released. Enzymes responsible for the oxidation of 3-chlorobenzoic acid to the chlorocatechols are inducible within 30 min of exposure, whereas those responsible for the subsequent oxidation of the chlorocatechols appear within 90 min. Figures 6; references 10: 2 Russian, 8 Western.
[1962-12172]

UDC 579.841.11-22

EFFECTS OF EXTRANEOUS SUBSTRATES ON BIODEGRADATION OF DDT BY PSEUDOMONAS AERUGINOSA

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 2, Mar-Apr 85
(manuscript received 7 Jul 83) pp 222-226

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[Abstract] Pseudomonas aeruginosa 640x was employed in a study on the effects of extraneous substrates (hexane, hexadecane, glucose, octane, butyrate, xylose) that potentiate DDT degradation on the activity of enzymes involved in DDT metabolism. There was a direct correlation between the effectiveness of these substrates in enhancing DDT metabolism and in increasing the activities of enzymes that generate reducing cofactors required for DDT dechlorination,

i.e., in elevating the activities of glucose-6-phosphate dehydrogenase (DH), alcohol DH, isocitrate DH, malic enzyme, acyl-CoA DH. Acetate, which does not enhance DDT degradation by Ps. aeruginosa, had no such effect on the enzymes of interest and did not, as a consequence, increase the cellular supply of NADP. Figures 1; references 18: 6 Russian, 12 Western.
[1962-12172]

UDC 577.1:547.963.2

EXPRESSION OF TWO VARIANT GENES OF HBsAg IN ESCHERICHIA COLI

Kiev BIOPOLIMERY I KLETKA in Russian Vol 1, No 2, Mar-Apr 85
(manuscript received 1 Oct 84) pp 99-105

BORISOVA, G. P., KALIS, Ya. V., DISHLER, A. V., PUMPEN, P. P., GREN, E. Ya., TSIBINOGIN, V. V. and KAKAYN, R. A., Institutes of Organic Synthesis and of Microbiology, Latvian SSR Academy of Sciences, Riga

[Abstract] Two variant genes for the synthesis of HBsAg are presumed to account for the existence of the viral proteins P21 and P24. Standard techniques of genetic engineering were employed to close the genes, which differ at the 5'-end, taking advantage of the regulatory elements of the E. coli tryptophan operon: the promoter Ptrp and the SD sequence of the leader peptide trpL. Recombinant plasmids were designed with an optimal distance for translation between the SD sequence and the corresponding ATG of the long or short version of the gene. Eight recombinant plasmids based on pBR322-trp were selected and tested in vitro and in vivo. With an E. coli cell-free (in vitro) system proteins equivalent to P21 and P24 were synthesized based on MW considerations. However, the in vitro polypeptides showed very weak reactivity with anti-HBsAg antibodies, presumably because cell-free synthesis did not favor formation of native three-dimensional configuration. Transformed E. coli cells yielded antibody-reactive P21, but immunoprecipitation with P24 was not obtained. Inadequate synthesis of P24 is believed to reflect the fact that both variants of the HBsAg gene, but especially that responsible for P24, inhibit E. coli growth. Figures 2; references 27: 5 Russian, 22 Western.
[1959-12172]

UDC 547.964.4.057:577.112.6

IGERCIN SYNTHESIS: C-TERMINAL NONAPEPTIDE OF HUMAN IgE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 5, May 85
(manuscript received 22 Oct 84) pp 590-597

CHIPENS, G. I., ANTSANS, Yu. Ye., BISENIYETSE, D. A., ZARINSH, P. P., OSIS, L.P. and SEKATSIS, I. P., Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga

[Abstract] Conventional methods of peptide synthesis were employed in the synthesis of human IgE heavy chain C-terminus nonapeptide (arg-ala-val-ser-val-asn-pro-gly-lys), since the nonapeptide has certain sequence similarities to peptides with established bioactivities (bradykinin, fibrinopeptide B, human anaphylatoxin). The peptide, designated igercin (ige = IgE, r = receptor (cellular), cin = kinin), was studied for potential binding to cell receptors as a mediator of IgE reactions. Preliminary studies, with details to be reported elsewhere, have shown that igercin acts as an antagonist of IgE and inhibits various allergic and inflammatory responses. In addition, igercin has been demonstrated to possess certain kinin-like properties. Figures 2; references 9: 5 Russian, 4 Western.
[1954-12172]

UDC 547.458.22'118'915.5.057+579.84

SYNTHESIS OF LIPID A ANALOGS: CONJUGATION AND ANTIGENICITY OF 2-DEOXY-2-(3-HYDROXYMYRISTOYL)AMINO-D-GLUCOSE-6-PHOSPHATE WITH POLYMERIC CARRIERS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 5, May 85
(manuscript received 2 Oct 84) pp 677-682

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[Abstract] Analogs of lipid A were synthesized for determinations of antigenicity of the phosphodiester method, with the structure of the 6-O-(2-aminoethyl)phosphono-2-acylamino-2-deoxy-D-glucose derivatives confirmed by elemental, chromatographic and NMR analyses. For use as haptens the derivatives were conjugated either to polysaccharide (Ficoll) or protein (HSA, BGG) carriers, and the conjugated employed in the immunization of rabbits. Specific anti-hapten

antibodies were demonstrated by gel diffusion tests and ELISA, with the antibodies induced against the analogs cross-reacting with lipid A derived from Yersinia pseudotuberculosis LPS. References 14: 3 Russian, 11 Western. [1954-12172]

EVOLUTION ANT SLEEP MODELS

Moscow ZNANIYE-SILA in Russian No 4, Apr 85, pp 20-23

[Article by V. Koval'zon, candidate of biological sciences: "Evolution and Sleep Models"]

[Text] "And you will also say," said the Dormouse without opening her eyes, that 'I breathe while I sleep' and 'I sleep while I breathe' are one and the same!"
"For you, in any case, it is the same!" said the Hatter...

Lewis Carroll
"Alice in Wonderland"
Translated by N. M. Demurova

How to sleep in the water, or rather how to sleep without drowning in one's sleep? This problem arose (in an evolutionary sense, of course) tens of millions of years ago for the ancestors of three large groups of mammals: cetaceans, pinnipedia, and sirenidae, who descended from dry land into the ocean and became deuteromarine animals. Until man appeared, these animals had almost no enemies except for one very frightful one who primarily influenced the course of selection in the direction of the best adaptation to the environment. This enemy was water--that element in which these mammals began to live. After all, they still breathed air as before. They had only to get sick, tired, weak or lose their coordination--the water would get in their lungs and the animals would die. Thus, the warm-blooded animals who had moved into the water were forced to learn to constantly maintain a certain posture and retain a sufficiently high level of activity. There could be no time for sleep!

In actuality, zoologists who studied mammals had noticed that certain of their species were in constant motion. Since it was considered an obvious fact that sleep is primarily a state of immobility, it was concluded that dolphins never sleep. However, John Lilly noted that there are also such species of these animals who often float motionless on the surface of the water, like a bobber, but at the same time one eye is always above the water and open. The researcher expressed the supposition that only one half of the dolphin's brain sleeps, while the other performs a watchful function. As we will see further,

Lilly, as they say, "hit the mark"... although the eye in this case has nothing to do with it. And moreover, Lilly's supposition was generally never verified experimentally.

Understandably, whales, dolphins, seals, not to mention sirenidae ("sea cows") entered into the international Red Book, are not laboratory rats, and performing complex physiological studies on them, particularly those associated with laboratory operations, is extremely difficult. It is no wonder that the sleep of these animals remained unstudied until most recently. Only in 1973 near Anapa did a small collective of researchers (including the author of this article) from the Institute of Evolutionary Morphology and Ecology of Animals (IEMEZh) imeni A. N. Severtsov under the USSR Academy of Sciences and headed by L. M. Mukhametov and A. Ya. Supin first begin a serious study of the sleep of Black Sea bottle-nosed dolphins.

Soon the Utrishskiy Marine Station of IEMEZh was founded, and the volume of scientific work was significantly expanded. Aside from the bottle-nose, another species of dolphin was studied--the so-called "azovka" or porpoise, which led a different lifestyle from that of the bottle-nose dolphin. Then pinnipedia were also included in the study.

* * *

As we know, the sleep of mammals and birds consists of two separate phases: slow and rapid, or paradoxical sleep, which differ from each other just as greatly as each phase of sleep differs from waking. When an animal or man goes to sleep, first slow sleep ensues, which grows gradually deeper. After a certain period of the deepest slow sleep, there is a sharp transition to paradoxical sleep. The period of paradoxical sleep completes the sleep cycle, whose duration depends on the size of the animal. In man, for example, it comprises one-and-a-half hours. Then there is either awakening, or a new cycle begins. It is specifically this cyclic alternation (and not the state of rest) which becomes apparent in recording the brain biopotentials, which is the main characteristic of sleep. Thus, the recording of biopotentials of dolphins during their swimming in water has shown a remarkable picture. The hemispheres of the dolphin's brain take turns sleeping! In this case the waking "on guard" hemisphere evidently ensures a sufficient level of activity. It maintains the necessary posture, gives the command to come to the surface every 30-40 seconds to take a breath, and directs swimming in a circle. A strong external stimulus leads to immediate waking of both hemispheres. It is especially interesting that falling asleep sometimes begins in both hemispheres simultaneously, but deep slow sleep is always observed in only one of the two hemispheres--either in the left or in the right. We must say that the anatomical connections between the hemispheres in the dolphin are quite clearly organized. Consequently, we may presume that there is a certain mechanism in the brain of the dolphin which actively maintains and regulates the alternation of the hemispheres in sleep. And in actuality, when the dolphins were administered substances which caused a simulation of double-hemisphere sleep, they were forced to awaken for every breath.

However, this was still not all. It turned out that dolphins have only the phase of slow sleep. All efforts to find even individual indicators of rapid, paradoxical sleep were unsuccessful. Evidently, adult dolphins have no paradoxical sleep at all. Yet up until now this phase of sleep was found in all species of warm-blooded animals--mammals and birds. The only exception in this regard is the sleep of the egg-laying mammal--the Austrailian echidna, which also has only slow sleep, without paradoxical However, the echidna is an animal which is unusual and remarkable in all respects, which has miraculously survived to the present day. In all other mammals, however, including the marsupials, as for example the "living fossil"--the opossum with his primitive brain--both phases of sleep are well expressed and differ little from the sleep of man.

Thus, it turns out that in the course of their adaptation to a totally marine form of life, for which dolphins had sufficient time (their evolution numbers 50 million years), these animals developed a series of specializations: a special form of the body and skeleton; a special skin which allows them to pierce through the water with unusual ease; a well-developed system of blood supply and respiration which enables them to dive deep and if necessary hold their breath; a well-developed thermoregulation; an ultrasound locator, sonar, which can "see" well in the absence of light; a huge brain to control this sonar; a complex system of sound communications which allows us to speak of the "language" of dolphins, and other most remarkable adaptations for life in a marine environment.

Among these adaptations which allow the dolphin to breathe during sleep without fear of drowning is also the uniquely organized sleep pattern: slow sleep seems to have been "split" among the hemispheres, while paradoxical sleep, which because of certain anatomical peculiarities of the brain systems regulating it evidently cannot be "split," has disappeared altogether in adult dolphins.

...How is it that the dolphin is able to do without paradoxical sleep. After all, according to numerous data, this phase is a vitally important state for other animals. Or, in other words, what price must the dolphin pay for the absence of paradoxical sleep? It is difficult to give even an approximate answer to this question at the present time...

Probably the most interesting were the experiments on depriving dolphins of sleep for several days. When they were finally allowed to sleep, the hemispheres slept alternately, with the "return" of sleep beginning with either of the hemispheres. However, the most remarkable fact occurred if only one of the hemispheres was deprived of sleep, while the other could sleep at will. It turned out that each half of the brain has its own need for sleep, which cannot be satisfied through sleep by the other half, as if the hemispheres belonged to two different heads! This fact is of considerable theoretical interest. It turns out that either each half of the dolphin's brain accumulates its own substances during sleep deprivation, which are then realized in the course of "return," or that the neuron systems perceiving these substances are arranged differently in each of the hemispheres. In any case, the study of sleep in the dolphin forces us to also re-evaluate the chemical regulation of sleep in man.

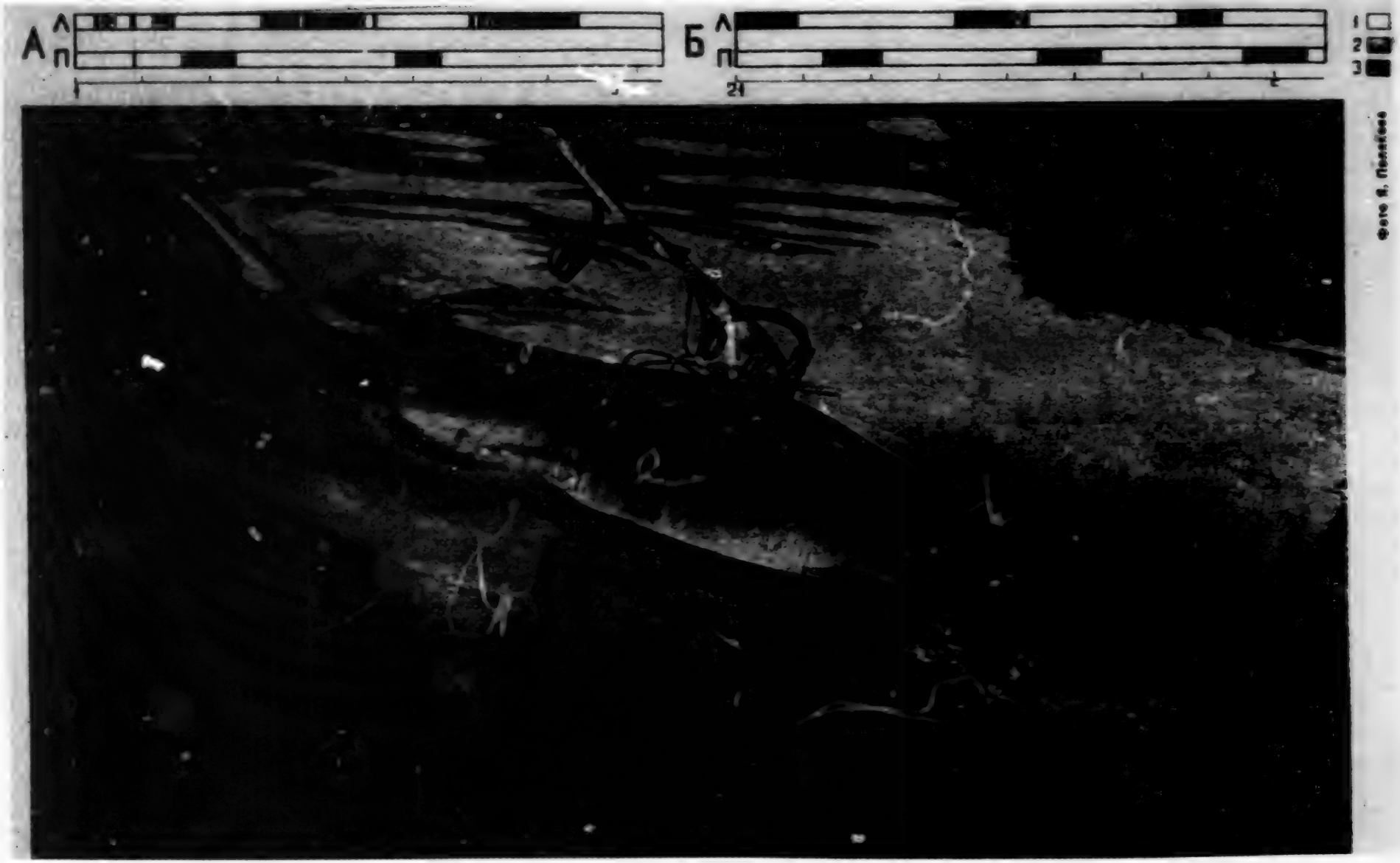

Figure 1. Normal and restorative sleep of the dolphin (Л - left hemisphere, П - right hemisphere). A - diagram of normal sleep; B - diagram of sleep of same dolphin after 3 days of sleep deprivation: 1 - waking time; 2 - superficial slow sleep; 3 - deep slow sleep.

Figure 2. Diagram of daily session of recording electrical brain activity of a dolphin swimming in a small pool. 1 - waking time; 2 - superficial slow sleep; 3 - deep slow sleep.

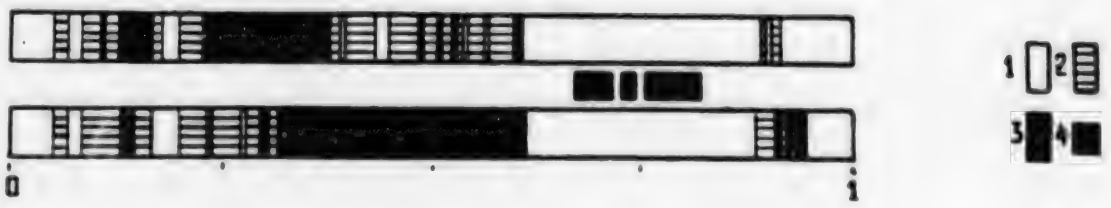

Figure 3. Diagram of a one-hour session of recording the sleep of a fur-seal: 1 - waking period; 2 - superficial slow sleep; 3 - deep slow sleep; 4 - paradoxical sleep.

Another important fact which is of general theoretical significance is the interrelation between sleep and dolphin behavior. Azovka dolphins are the most interesting in this regard. These comparatively small (up to 30-40 kilograms) animals feel at ease in experimental pools and swim constantly in a circle. Their swimming speed is not reduced during sleep. Actually, if we observe only the behavior of the Azovka, we might come to the wrongful conclusion that this animal never sleeps. On the other hand, if we observe the behavior of some 200-kilogram bottle-nose dolphin hanging immobily in the posture of a bobber in a small experimental pool, we might think that it sleeps continuously, although in actuality its sleep takes up less than half of a 24-hour period. Thus, ethological observations in the study of sleep in dolphins, as well as in other animals, show that the need for sleep is not associated with the need for physical rest, as has been believed up to now. Azovka dolphins do not need physical, bodily rest. However, single-hemispheric slow sleep for them also takes up around half of the 24-hour period. Consequently, this sleep fulfills a certain as yet unknown vitally important function in meeting the needs of the brain itself.

Lilly's supposition regarding the fact that single-hemispheric sleep is tied with the guarding function of one eye was also not confirmed. Tests have shown that the appearance of a new or unusual object in the field of vision of the dolphins eye looking above the water, if the eye is open, leads to immediate waking of the animal even if this eye is opposite the "sleeping" hemisphere (in dolphins each eye is tied only with one hemisphere opposite it, and the field of vision of each eye is almost 180 degrees). Thus, the eye, if it is open, continues to see even during sleep, and single-hemispheric sleep is not required for this.

The discovery by Soviet scientists of the phenomenon of alternative single-hemispheric slow sleep in dolphins caused considerable interest in our country as well as abroad. Recently its authors--L. M. Mukhametov and A. Ya. Supin--were given a diploma for their discovery by the State Committee on Inventions and Discoveries under the USSR Council of Ministers.

* * *

Naturally, the question arises: how do other marine mammals sleep, and primarily the pinnipeds? Experiments with Caspian Sea seals were conducted at the Utrishskiy Station. It turned out that seals sleep only around 3 hours in a 24-hour period. Also, they may sleep in different conditions and postures: on a ledge under water, on the surface of the water, in the water, and lying on the bottom of the pool. In other words, it became further apparent that the sleep of seals is the typical sleep of the mammal with well expressed phases of slow and paradoxical sleep and a well-defined cyclic character--slow sleep always occurs strictly symmetrically and simultaneously in both hemispheres. If the seal sleeps on a ledge or on the surface of the water, but in such a way that his nostrils are in the air, he need not awaken for each breath. If, however, the nostrils are submerged in water, the animal awakens for every breath, and if necessary swims up and sticks out its nostrils. In these cases, the seal sleeps in snatches during the breathing pauses. Thus, seals demonstrate a different, less radical variant of adaptation to sleep in the water. This is not remarkable if we remember that the evolution of pinnipeds

numbers only 10 million years--about 5 times less than cetaceans. It is interesting that the information from the sensitive nerve endings in the sphere of the nostrils in seals evidently continues to be processed both in deep slow and in paradoxical sleep.It is specifically this which forces the animal to interrupt its sleep and swim up to the surface for exhaling-inhaling if the nostrils are in the water.

Recently, in cooperation with the USSR Academy of Sciences and the Cuban Academy of Sciences, Academicians V. Ye. Sokolov and L. M. Mukhametov undertook their first effort at studying the sleep of the American manatee, the "sea cow". The first experiments showed that the sleep of the manatee is evidently similar to the sleep of the Caspian seal.

And yet the studies of sleep in the North Sea fur-seals conducted recently at the Utrishskiy Marine Station by L. M. Mukhametov, O. I. Lyamin and I. G. Polyakova, presented a surprise--one other type of sleep was discovered.

The fur-seals spent much time immobile with their eyes closed, yet generally this was a quiet waking period. Sleep took up only slightly more than a third of the 24-hour period. Along with the double-hemispheric slow sleep which is common for all mammals, part of the sleep time was taken up by periods of sharply expressed inter-hemispheric asymmetry, which differed significantly in certain details from the single-hemispheric sleep of dolphins.

If the fur-seal slept on a ledge above the water, then the periods of asymmetrical slow sleep took up half the time of the entire sleep period, and the contrast between the hemispheres was expressed rather weakly. Paradoxical sleep, which was always bi-hemispheric, took up 20 percent of the total sleep time, as in most other mammals including man. However, if the pool was filled to the top with water so that the animals were forced to sleep while afloat, then the character of the sleep changed drastically. The amount of asymmetrical slow sleep increased significantly, the contrast between the hemispheres increased, and paradoxical sleep was suppressed.

Thus, the sleep of the fur-seal represents a third, seemingly intermediate, form of adaptation of sleep to a marine form of life. If the fur-seal sleeps on dry land, then his sleep resembles the sleep of land mammals, and if he sleeps in the water--it is reminiscent of the sleep of dolphins, since fur-seals, like dolphins, possess regular breathing. In other words, fur-seals, which may demonstrate all forms of sleep--double-hemispheric deep slow sleep, single-hemispheric slow sleep and paradoxical sleep--represent a unique model for testing various theories on the nervous and chemical regulation of sleep.

* * *

Work on the study of sleep in marine mammals is continuing at the Utrishskiy Station. There are plans to study sleep in a number of other representatives of this extensive group of animals, and to use certain new methodologies. The study of sleep in baby dolphins and seals is also of great interest. The fact is that the structure of sleep at an early age differs sharply from the sleep of the adult organism--a large portion of it is taken up by the so-called activated sleep, which is considered to be the analog of paradoxical sleep in adults.

The most intriguing is the question of whether the remnants of this form of sleep are retained in baby dolphins. After all, as we have indicated above, adult dolphins do not manifest any indications of paradoxical sleep. Future studies will answer this question.

Work on studying the sleep of dolphins and other marine mammals is not merely a study of exotic animals. Such studies present considerable general theoretical and even practical interest from several points of view. First of all, as we have already said, single-hemispheric slow sleep of dolphins and fur-seals is a unique model for studying the action of existing and future soporific medications, as well as for testing various hypotheses regarding the biochemical regulation of sleep. Secondly, the absence of paradoxical sleep in adult dolphins is the touchstone for various theories on the function of paradoxical sleep and one of the most intriguing questions in current physiology. Thirdly, the very existence of single-hemispheric slow sleep during movement in .azovka dolphins is incompatible with theories of "sleep as rest for the body" and indicates that sleep is necessary for the brain, and specifically for each of its hemispheres (let us remember the tests with sleep deprivation). There is yet another rather important aspect with which we should deal in greater detail. We are speaking of the interrelation between sleep and respiration, or the regulation of breathing during sleep.

We know that during sleep, especially during deep slow sleep, the sensitivity of the brain's respiratory center is reduced to accumulation of carbon dioxide in the blood. The regulation of respiration is weakened. Greatly exaggerating, we might say that in deep slow sleep respiration "hangs on a thread." The well-known sleep researcher, American scientist William Dement, recently said that there is a probability for a man who seems to be and actually is perfectly healthy to die in his sleep. Obviously, this is a theoretical discussion, and there is actually nothing to be frightened of. This type of probability is insignificantly small. However, it really does exist, which is evidenced by a recently described illness, whose name may be approximately translated as the "Eastern night suffocation syndrome." These are extremely rare cases of sudden death during the sleep of healthy young men of Asian descent. It is believed that the basis for this grave syndrome is some kind of genetic disorder which weakens the regulation of respiration and the heart during sleep.

Moreover, there is still another, unfortunately more commonly encountered illness, which is called sudden death syndrome in infants. In this case there is sudden cessation of breathing and stoppage of the heart in children during the third month after birth. The reasons for this are also supposed to be some hidden defects in the regulation of breathing and work of the heart during sleep. Moreover, it has been demonstrated that the risk of sudden death during sleep due to stoppage of respiration and the heart increases sharply after ingestion of alcohol, especially chronic, with overdose of barbiturates and certain other medicines, with hypoxia under high elevation conditions, etc. The study of the physiology of sleep in marine mammals, which seemingly represents purely academic interest, gives a unique model for pharmacological

and experimental studies of the interconnection between respiration and sleep and, undoubtedly, will be of great benefit to medicine in the future.

12322
CSO: 1840/1875

HUMAN-DOLPHIN COMMUNICATION RECORDED

Moscow LENINSKOYE ZNAMYA in Russian 1 May 85 p 4

[Article by M. Dmitruk: "Dialogues With the Dolphins?"]

> [Text] Soviet and foreign scientists and journalists, gathered recently in the Inturist Hotel in Moscow, listened to a tape recording of an amazing concert. To the accompaniment of the crashing of the surf and the tones of an electric guitar they heard the songs of members of the genus Liocassis, one of the largest species of dolphin, which can reach to seven meters in length and nine tons in weight. The powerful voices of the dolphins, recalling the sounds of the Lorelei, blended harmoniously into an overall melody.

The recording took place in the strait between the island of Vancouver and the western shore of Canada. The small ship Dynasty cruised there, equipped by enthusiasts as a floating sound recording laboratory. Human voices and the melodies of electric guitars and other instruments could be transmitted along cables into the water, and sensitive hydrophones would detect any responses issuing from the depths. The singers and musicians stood on a narrow deck and attempted to attract the dolphins to the ship by their art. In a little while the dolphins did in fact swin towards them: on the surface of the water appeared their slanted flippers, there were clicks and whistles, and finally the powerful sounds of the Lorelei. Each musical phrase performed on board the ship drew a response from the water. Thus the people and dolphins communicated with each other. This kept up for days and nights on end.

But it turned out that the dolphins were interested less in the music than in its performers. They were afraid to come closer than half a mile from the boat (they probably were aware that the metal tubs are often associated with nets and harpoons). Yet they boldly swam around canoes and rowboats with people in them, singing them their epic songs, dancing, leaping halfway out of the water, and loudly clapping their flippers together. They responded to the enthusiastic applause of the humans by uttering long series of sound signals. This resembled a real dialogue, of the type so long fantasized in fiction.

By such behavior the dolphins were attempting to demonstrate their interest in communicating with humans. They were amazingly peaceable, swimming and diving

near the small boats, and did not once strike them with their huge flippers and tails. When one boy, to show his complete trust in the dolphins, dived out of a boat into the water and swam towards the shore, he was escorted by an "honor guard" of dolphins. The boy felt that he would be quite safe in such company in the open sea.

These oral tales, written accounts and tape recordings may strike us as unbelievable. For many centuries the dolphins were considered to be the most fearful predators. "Whale killers", "sea wolves" and other such awful names were applied to them by humans. How close do these metaphors correspond to reality?

To be sure, the dolphins do have enormous teeth, eat large fish, and even attack whales. Unlike dogfish and barracudas, however, they never kill those of their own kind. On the contrary, they have a communal way of life based on mutual aid. The main thing is that they are very respectful towards humans, probably because they realize how powerful they are. On top of this, there are cases on record of dolphins saving humans who had been lost at sea as a result of shipwreck.

We learned all this from Virginia Coyle, who brought with her to Moscow tape recordings of the musical dialogues between humans and dolphins.

"People have invented a myth about the dolphin as a robber of the high seas, a monster, a killer," she said, but our dialogues with the wild dolphins testify to their amazing peacefulness, and their tact in relating with humans.

The enthusiasts setting up the experiment did not, however, have any guarantee of success. What was it that gave them faith and strength?

French anthropologists who spent many years in central Africa discovered a dolphin cult among the Dogon tribes.

In these tribes, which inhabit Mali, the natives have, as long as anyone can remember, worshipped the dolphin-like being Nommo, said to be the founder of human civilization on earth. The Dogons consider themselves, along with the dolphins, to be the descendants of Nommo, some of whom live on land while the others have entered the ocean.

One could regard this African legend as a poetic invention if it were not for its strange details. The Dogons claim that Nommo flew to earth from the star system Sirius, more precisely, from Sirius B (which they call Po). Long before this star was "discovered" by astronomers with the aid of modern telescopes, the Dogons knew that it was a white dwarf ("the smallest and heaviest of all stars") and revolved around Sirius A in an elliptical orbit with a period of 50 years. Both the dolphins and Sirius were worshipped by the ancient Sumerians, the Egyptians, Greeks, and Indians.

Equal surprises were in store for physiologists studying the dolphin brain. In Lioeassis it was much heavier than the human brain, with more convolutions and nerve cells. Finally, Soviet scientists recently discovered that the dolphin brain has the capability of sleeping with either the left or the right

hemisphere. No other living creature on earth, including man, has this ability. In the developed countries many people do not wish to reconcile themselves to the barbaric annihilation of the dolphins. They are searching for ways to communicate with them.

Progressive scientists and artists, despite ancient predictions, are trying to save the dolphin from extermination. It is perhaps utopian to believe that the dolphins are our brothers in understanding, but this is a fundamentally very humane attitude. It is, of course, more in harmony with the ideals of our times than the myth of sea robbers and killers.

"If scientists ever succeed in translating the singing of the dolphins into human language," says Virginia Coyle, "then we would perhaps hear words such as the following: 'People of Earth, for thousands of years we have been trying to explain to you how ineffably joyful it is to live in harmony. You have now heard us.'"

9832

CSO: 1840/341

UDC 612.21

DETERMINATION OF OXYGEN CONSUMPTION AND PARAMETERS OF EXTERNAL RESPIRATION OF SEALS (PHOCA VITULINA) UNDER CONDITIONS OF FREE SWIMMING IN A POOL

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian
Vol 71, No 3, Mar 85 (manuscript received 29 Dec 83) pp 389-392

BARANOV, Ye. A., PETROV, Ye. A. and BARANOV, V. I., Automation Laboratory of Limnologic Studies and Hydrooptics (Chief P. P. Sherstyakhin) and Division of Ichthyology and Hydrobiology (Director A. A. Linevich), Limnological Institute, Siberian Department of the USSR Academy of Sciences, Irkutsk; Laboratory of Microcirculation (Director K. A. Shoshenko), Institute of Physiology, Siberian Department, USSR Academy of Medical Sciences, Novosibirsk

[Abstract] The indices of external breathing represent important characteristic in physiological studies of marine mammals. A method was developed for measuring gas exchange in seals freely swimming in rather large pools. The method is based on the observation that these animals breathe in winter through small holes in the ice. The animals (Baikal seals) were placed in a round pool (3 mm diameter, 1.3 m depth); a metallic mesh was placed in the pool at a height of 1 m. The mesh contained an opening for feeding and breathing; a breathing apparatus could be attached to this opening making it possible to determine the frequency and the depth of respiration along with the determination of partial oxygen pressure. Figures 3; references 5: 4 Russian, 1 Western.
[1948-7813]

MEDICINE

WORK ON IMPROVED CAT SCANNERS FOR NEUROSURGERY

Moscow MEDITSINSKAYA GAZETA in Russian 26 Jun 85 p 4

SKORBILINA, A.

[Abstract] The article recounts a visit to a clinic of the Moscow Oblast Clinical Scientific Research Institute imeni Vladimirskiy, where work on the testing and improvement of Soviet-made computer tomographs is in progress. This clinic is headed by Professor V. Ye. Bryk.

An account is given of an examination of a patient which was conducted, using a computer tomograph, in the institute's neurosurgery department. Junior science associate T. V. Stavitskaya took part in this examination. An image of a section of the brain that is 10 millimeters thick can be obtained in three minutes with the aid of this tomograph, it is claimed.

The tomograph has substantially expanded neurosurgeons' capabilities, according to I. M. Pritula, secretary of the clinic's Communist Party organization. He reported that personnel of the clinic are seeking to improve the tomograph's output parameters, lengthen the time that it functions continuously (on a two- and three-shift basis) and heighten the reliability of the design of each of its units and the complex as a whole. The clinic is collaborating in this work with an experimental plant and with personnel of the All-Union Scientific Research, Planning-and-Design and Technological Institute of the Cable Industry, particularly Doctor of Physical-Mathematical Sciences I. B. Rubashov, deputy director of this institute. It is noted, in conclusion, that the 1984 USSR State Prize and a gold medal of the USSR Exhibition of National Economic Achievements were awarded to Rubashov and Bryk, respectively, for their work on computer tomographs.

FTD/SNAP
CSO: 1840/1967-E

UDC 591.089.84;612.8

PROCESSES OF DYSTROPHY AND COMPENSATORY RECOVERY IN CEREBRAL CORTEX NEURONS AFTER HYPOXIA AND TRANSPLANTATION OF EMBRYONIC NERVOUS TISSUE IN RATS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 282, No 3, May 85
(manuscript received 3 Dec 84) pp 712-716

POLEZHAYEV, L. V., ALEKSANDROVA, M. A. and GIRMAN, S. V., Institute of General Genetics imeni N. I. Vavilov, USSR Academy of Sciences, Moscow

[Abstract] A study was conducted on the effects of transplanting embryonic nervous tissue in rats, its connection with neurotrophic factors liberated as a result of surgical trauma and the processes of dystrophy and compensatory recovery in the cerebral cortex. The rats were divided into two groups, one of which was exposed to 26 days of hypoxia. Each group was further subdivided, with one subgroup receiving a transplant of embryonic nervous tissue in the parietal area, a second receiving physiological saline and a third as control. Animal brains were examined for irreversible dystrophy 4 and 100 days after surgery. No statistically significant increases in shriveled or lysed neurons were seen at 4 days. After 100 days animals exposed to hypoxia alone had fewer normal neurons and more lysed neurons. Transplantation decreased the extent of these changes. This indicates that hypoxia accelerates spontaneous dystrophy, while transplantation of embryonic tissue can partially counteract this effect. Transplantation increased the number of binuclear neurons at 4 days, indicating active synthesis of r-RNA. After 100 days, transplantation increased the number of binuclear neurons in animals exposed to hypoxia and decreased the number of binuclear neurons in animals not so exposed. The data indicate that transplantation of embryonic nervous tissue increases compensatory recovery in the brains of rats exposed to hypoxia. References 6 (Russian).
[1910-12126]

UDC 579.84-22:535.37

PARTIAL IN VITRO RECONSTRUCTION OF BACTERIAL LUMINESCENT SYSTEM

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 2, Mar-Apr 85
(manuscript received 22 Sep 83) pp 209-213

MEZHEVIKIN, V. V., VYSOTSKIY, Ye. S., ZAVORUYEV, V. V., KUZNETSOV, P. V. and RAYBEKAS, A. A., Institute of Biophysics, Siberian Department, USSR Academy of Sciences, Krasnoyarsk

[Abstract] Studies were conducted on chromatographic resolution and reconstruction of the luminescent system of Photobacterium leiognathi to ascertain the proposed metabolic mechanism responsible for luminescence as $RCHO + FMNH_2 + O_2 \rightarrow RCOOH + FMN + H_2O + h\nu$. Pressure-disrupted P. leiognathi extracts were chromatographed on Sepharose 6B columns to remove luminescence-inert components, and subsequently chromatographed on hydroxyapatite to yield two nonluminescent fractions which, on recombination, yielded weak luminescence. One of the fractions was identified as containing luciferase, whereas the other contained the flavin chromophoric components. Spectral and chromatographic analysis of the latter fraction showed the presence of a protein-bound flavin and significant concentration of cytochrome. Since many bacterial dehydrogenases are isolated jointly with cytochrome, it may be that the aldehyde dehydrogenase of the luminescent system was linked with the cytochrome which is involved in FMN reduction. The reconstruction data are regarded as providing additional confirmation for the scheme presented above. Figures 6; references 8: 7 Russian, 1 Western.
[1962-12172]

UDC 575.21:582.288

VARIABILITY IN PULLULARIA PULLULANS IN RELATION TO PLOIDY

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 2, Mar-Apr 85
(manuscript received 14 Jun 83) pp 233-238

IMSHENETSKIY, A. A., KONDRAT'YEVA, T. F. and LABACHEVA, N. A., Institute of Microbiology, USSR Academy of Sciences, Moscow

[Abstract] General studies on the relationship between mutagenicity and ploidy have been conducted with Saccharomyces, and are presently being expanded to P. pullulans to cover UV-induced and spontaneous mutations. For UV-induced

mutations, the P. pullulans conidia were irradiated with 90% lethal UV dose: 2790.0 ergs/mm^2 for the haploid and diploid strains, and 372 ergs/mm^2 for the tetraploid strains. In the case of spontaneous morphological mutations graphical presentation showed that the highest incidence was encountered in haploid microorganisms (ca. 8.5%), followed by diploid (ca. 2.5%) and tetraploid (ca. 1.5%) organisms. The incidence of UV-induced morphological mutations showed an inverse relationship relative to ploidy, suggesting an increase in the frequency of dominant mutations. The respective frequencies of spontaneous and UV-induced auxotrophic mutations in the haploid (0.099% and 0.31%, respectively), diploid (0.21 and 0.77%) and tetraploid (0.78 and 1.20%) microorganisms showed that induced mutations exceeded spontaneous mutations 1.5- to 3.1-fold. Increased ploidy values also favored an increase in UV-induced mutations in the respiratory system over the spontaneous incidence. Polyploidy was thus seen to favor an increase in the incidence of various mutations and, therefore, to constitute a valuable resource for breeding studies. Figures 5; references 19: 12 Russian, 7 Western.
[1962-12172]

UDC 582.282.23:579.24

COMBINED CULTIVATION OF TRICHODERMA LONGIBRACHIATUM AND ENDOMYCOPSIS FIBULIGERA

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 2, Mar-Apr 85
(manuscript received 2 Aug 83) pp 274-279

GAVRISTOV, A. V., ZHITSKAYA, Ye. A. and CHURAKOVA, A. B., Food Industry Technologic Institute, Moscow

[Abstract] An evaluation was made of the possibility of combined cultivation of a cellulase producer, the fungus Trichoderma longibrachiatum, and a glucoamylase producing yeast, Endomycopsis fibuligera. A complex medium was designed that would support both microorganisms in monoculture and served for determination of control levels of enzyme production. Maximum activity of the yeast was seen after three days of culture, and of the fungus after 7 days. In combined cultivation using simultaneous inoculation or inoculation with the yeast after 1 or 2 days of T. longibrachiatum growth, maximum enzyme activities ranged from 40 to 70% of that seen with the monoculture. The low levels of cellulase (ca. 40%) detectable when E. fibuligera was inoculated 1 or 2 days after the fungus, or the virtual lack of glucoamylase activity and yeast growth when the yeast was inoculated by the 4th day, were ascribed to a complex interplay of a number of dynamic factors. Such factors--accumulation of selective inhibitors, depletion of nutrients by one microorganism, toxin production, etc.--will have to be carefully analyzed before combined enzyme preparations can become technically feasible via combined cultivation. Figures 4; references 15: 8 Russian, 7 Western.
[1962-12172]

UDC 579.873.11:57.083.3

EFFECTS OF GROWTH CONDITIONS ON RHODOCOCCAL ANTIGENICITY

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 2, Mar-Apr 85
(manuscript received 2 Sep 83) pp 290-292

IVSHINA, I. B., PSHENICHNOV, R. A. and KEVORKOV, N. N., Institute of Plant and Animal Ecology, Ural Scientific Center, USSR Academy of Sciences, Perm

[Abstract] The effects of cultivation conditions on the antigenicity of Rhodococci were evaluated in a system involving growth of the microorganisms either on a mineral medium under 1:1 propane:air mixture, or on meat-peptone agar, and subsequent antigenic analysis of the sonicated cells with rabbit antisera. Ouchterlony plates with either neat or adsorbed sera demonstrated antigenic differences between the rhodococcal populations grown under the conditions specified. Specifically, Rhodococcus cultivated under propane possessed antigenic determinants lacking in microorganisms cultivated under standard conditions. These observations indicate that serological techniques can be utilized in the search for rhodococci capable of utilizing designated volatile hydrocarbons. Figures 4; references 5: 3 Russian, 2 Western.
[1962-12172]

UDC 550.72:553.982

EFFECTS OF ADDITIONAL OIL STRATUM AERATION ON MICROBIOLOGICAL PROCESSES

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 2, Mar-Apr 85
(manuscript received 2 Sep 83) pp 293-300

IVANOV, M. V., BELYAYEV, S. S., LAURINAVICHUS, K. S., OBRAZTSOVA, A. Ya., GORLATOV, S. N. and BONDAR', V. A., Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino

[Abstract] In 1979-1980 field studies were conducted at Tatar ASSR oil fields to assess the effects of additional aeration of oil-bearing strata on microbiological processes. Longitudinal studies over a 68 day period following introduction of aerated water showed that the initial microbial changes consisted of activation of hydrocarbon oxidation and an increase in the numbers of aerobic bacteria. After 28 days some elevation of methane production was noted, indicating the initial stages of anaerobic microbial processes. After 68 days direct evidence of aerobic processes was absent and bacterial methane production was intensified. In addition to the production of commercially important carbon dioxide, fatty acids, methane, etc., such products themselves render residual oil more recoverable. References 17: 6 Russian, 11 Western.
[1962-12172]

UDC 579.811.42.017.64

RESPONSE OF LABRYS MONAHOS TO LIMITING SUBSTRATE CONCENTRATION DURING CHEMOSTAT CULTIVATION

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 2, Mar-Apr 85
(manuscript received 20 Jul 84) pp 329-330

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USSR Academy of Sciences, Moscow

[Abstract] The oligotrophic prosthecate bacterium Labrys monahos was employed as a test-bacterium to study the response of this class of bacteria to changes in substrate concentration. In chemostat cultivation on medium recommended [sic] for prosthecate bacteria with 0.025% glucose a classical growth curve was obtained with stationary phases obtained with 6 dilution rates (D). The last stationary phase was obtained with $D = 0.12\ h^{-1}$; a constant biomass prevailed with prostheca formation and complete glucose utilization. A 10-fold increase in the glucose concentration to 0.25% failed to yield a proportional increase in biomass and resulted in morphological changes, with 0.2% glucose remaining unutilized at minimum D ($0.04\ h^{-1}$) and maximum biomass. Since the critical value of D was unaffected, the changes were attributed to an unbalanced medium since only the glucose concentration was increased, while the mineral components remained constant. Figures 2; references 5: 4 Russian, 1 Western.
[1962-12172]

UDC 612.172:612.858:613.68:616.839

DYNAMICS OF CHANGES OF STATISTICAL INDICATORS OF HEART RHYTHM OF PERSONS WITH DIFFERENT DEGREE OF MOTION SICKNESS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85
(manuscript received 14 Mar 84) pp 157-158

MARKARYAN, S. S., IGREVSKIY, A. V. and KOROTKOV, Yu. A., Scientific Research Institute of Hygiene of Water Transport, USSR Ministry of Health, Moscow

[Abstract] Study of the possibility of using variation pulsometry to reveal latent forms of motion sickness in seamen who participate in long voyages involved examinations and observations of 44 naval college students ranging in age from 19 to 23 years and 22 seamen ranging in age from 28 to 32 years, each with nearly 5 years of sea duty, showed that use of this procedure with study of the usual physiological parameters of the state of the human body could be used to detect latent motion sickness in seamen. There were definite differences of adaptation to motion sickness in persons with different levels of resistance to Coriolis acceleration. Subjects resistant to vestibular effects revealed only a slight tendency toward insignificant changes of heart rhythm. References 5 (Russian).
[1943-2791]

MOLECULAR BIOLOGY

UDC 577.1

TRANSFORMATION OF HANSENULA POLYMORPHA YEAST BY HYBRID PLASMIDS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 282, No 3, May 85
(manuscript received 17 Dec 84) pp 741-743

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[Abstract] The construction of a host-vector system for gene cloning in H. polymorpha DL-1 was investigated. The system developed involved an auxotrophic leu^- mutant of H. polymorpha, obtained with 1-methyl-3-nitro-1-nitrosoguanidine, and a plasmid (pL2) containing the leu2 marker gene from S. cerevisiae and a mitochondrial fragment of DNA from C. utilis. The results indicate that the C. utilis mitochondrial fragment, which can promote plasmid replication in S. cerevisiae, performs this function in H. polymorpha as well. Transformation frequency was 1-5 x 10^3 colonies per microgram of plasmid DNA. After 8 generations on nonselective media only 10% of the cells retained the transformed trait and were thus able to grow on leucine-deficient media. When S.cerevisiae DNA was used to transform H. polymorpha protoplasts low transformant frequency and stability were observed. Polyoma virus plasmids were also able to transform the H. polymorpha auxotrophs, but also less efficiently than the pL2 plasmid. Isolated DNA from the pL2 transformants transformed E. coli HB101 leuB to leu^+ and E. coli JA228 argH to arg^+. The results indicate that the pL2 plasmid can transfer genes between E. coli and yeasts like S. cerevisiae and H. polymorpha. Figures 1; references 10: 4 Russian, 6 Western. [1910-12126]

UDC 577.217.53.083.3

USE OF MONOCLONAL ANTIBODIES FOR PURIFICATION OF ELONGATION FACTOR G FROM THERMUS THERMOPHILUS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 3, Mar 85
(manuscript received 30 Aug 84) pp 311-315

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[Abstract] Polypeptide chain elongation factor G is an important component of prokaryotic protein synthesizing apparatus. Factor G from Thermus thermophilus is highly resistant to many denaturating effects; it is a protein monomer with MW about 80,000. To purify this factor, an immunoadsorbent was prepared with monoclonal antibodies to G-factor by coupling purified ascitic fluid to CNBr-activated Sepharose 4B. The product obtained preserved enzymatic activity and was shown to be highly purified as established by Western blot and the ELISA test, the only trace impurity being related to some degraded G factor. The immunoadsorbent could be used repeatedly (up to 15 times) and was stable at 4°C in presence of 0.02% sodium azide solution for a long time. Figures 3; references 16: 2 Russian, 14 Western.
[1951-7813]

UDC 612.014.4:612:017.2

SPATIAL DYNAMICS OF BIOELECTRICAL PROCESSES OF BRAIN DURING PROLONGED CONTACT WITH PHYSICAL FACTORS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 10, No 6, Nov-Dec 84
(manuscript received 8 Jan 84) pp 921-928

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[Abstract] Study of the spatial organization of the EEG activity of the brain of man under normal circumstances and under prolonged effect of superhigh frequency electromagnetic fields involved examination of 155 workers ranging in age from 20 up to 39 years and working while exposed to electromagnetic fields for periods ranging from 2 up to 20 years and selection, from these, of 34 persons with no cerebral-cranial trauma, neuroinfection, psychotrauma, somatic or other diseases in their anamnesis for neurophysiological study. Monopolar EEG (symmetrically from the frontal, parietal and occipital regions) and EKG were registered during work and at psychosensory rest. Plasticity of the subjects' neurodynamic processes was assessed during voluntary regulation of the alpha-rhythm. Graphs of spatial-discrete interaction of isoelectric states of the EEG of the various zones of the brain were recorded by a digital computer. Prolonged periods of work while exposed to superhigh frequency electromagnetic fields produces phase changes of the spatial-discrete organization of neurorhythms of the brain. Working under these conditions for periods from 7 up to 14 years produces stress on the adaptational potentials of the organism and causes asthenization of mechanisms of self-regulation of the brain, which disturbs other functions of the organism. The maximum permissible period of work under these conditions is 7-14 years. Figures 4; references 22: 20 Russian, 2 Western.
[1941-2791]

UDC 612.014.42:612.4

EFFECT OF SINGLE ACTIONS OF WEAK ELECTROMAGNETIC FIELDS OF ULTRALOW FREQUENCY ON INDICES OF ENDOCRINE SYSTEM

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 2, Mar-Apr 85
(manuscript received 16 Sep 83) pp 293-299

ZAGORSKAYA, Ye. A., Moscow

[Abstract] Functioning of the human endocrine system was studied after a single exposure to weak electromagnetic field of ultralow frequency with a tension close to the real geomagnetic background and one approaching the alpha rhythm of human EEG. A single 5 hr exposure of healthy male subjects (25-45 years old) led to decreased activity of hypophysis-adrenal system in 25 out of 30 subjects as manifested by lower levels of urinary 17-keto steroids, lower plasma cortisol and corticosterone and increased ACTH levels. This was accompanied by increased levels of circulating blood testosterone which in some cases exceeded the normal physiological range. Increased levels of TSH and free and total thyroxin in blood was noted in 9 out of 30 subjects. Most of these findings were reversible; they appeared to represent adaptable compensatory reactions of the regulatory systems showing that this system is highly sensitive to the effect of a magnetic field. Figures 2; references 36: 27 Russian, 9 Western. [1944-7813]

UDC 612.815:616-003.725

EFFECT OF AGRIOPE LOBATA VENOM ON NEUROMUSCULAR TRANSMISSION

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 1, Jan-Feb 85
(manuscript received 31 May 84) pp 128-130

LISHKO, V. K. and ROMANENKO, A. V., Institute of Biochemistry imeni A. V. Palladin, UkSSR Academy of Sciences, Kiev

[Abstract] Study of the effect of Agriope lobata venom on neuromuscular transmission in the sartorius muscle (n. ischiadicus-m. sartorius) and extensor pollicus (m. ext. long. dig. IV) involved intracellular abduction of miniature end plate potentials and end plate potentials by the usual method. Application of the venom in a $1 \cdot 10^{-5}$-$1 \cdot 10^{-4}$ concentration to neuromuscular preparations of the sartorius reduced the amplitude of the end plate potentials but the effect was reversible and the end plate potentials returned to initial values in 50 minutes. The venom did not produce any visible effect on miniature end plate potentials frequency but it inhibited their amplitude. It was assumed that the venom inhibits neuromuscular transmission, preventing postsynaptic effects of acetylcholine. Apparently the venom or a component of it interacts with acetylcholine receptors of the muscle cell. Figures 2; references 8: 5 Russian, 3 Western.
[1940-2791]

UDC 577.352:591.145.2

SURFACTANT ACTIVITY AND PUTATIVE LYTIC MECHANISM OF MELITTIN

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 4, Apr 85
(manuscript received 25 Oct 84) pp 395-404

KSENZHEK, O. S. and GEVOD, V. S., Dnepropetrovsk Institute of Chemical Technology

[Abstract] An analysis was conducted on the surface properties of melittin at air/water interface, over water containing different electrolyte concentrations. Melittin was determined to form stable monolayers, with film pressure determined by both the electrolyte and melittin concentrations. On solutions with low electrolyte concentrations low melittin concentrations (S = ca. 100 nm^2/molecule) have a film pressure of 7-10 mN/m, considerably higher than that

commonly encountered with low concentrations of other surfactants (ca.3-5 mN/m). Furthermore, with low melittin concentrations an increase in the ionic strength results in a decrease in film pressure of the monolayer, suggesting shielding of the charged polar groups of the peptide. At higher melittin concentration ($S < 5$ nm^2/molecule), film pressure increases with an increase in the electrolyte concentration, in distinction to the effects obtained with most ionogenic surfactants. Analysis of the pressure and boundary potential data indicated that on low electrolyte solutions low concentration melittin films exist as ionized monomers, forming tetramers at higher melittin concentrations. Tetramers are also formed on high electrolyte solutions by low concentration melittin. Transformation of the monomers into tetramers is accompanied by formation of charged peptide-ion complexes on solutions in which the electrolyte concentration equals or exceeds 10^{-2} M, and is due to anion uptake by the tetramers from the solution. The uptake of electrolyte anions may be a factor in the lytic mechanism of action of melittin on biological membranes. In a situation in which the N- and C-termini of melittin are distributed or located on opposite surfaces of the membrane, an increase in the intramembranous concentration of melittin would favor tetramer formation which can then function as anion channels. Figures 8: references 13: 1 Russian, 12 Western.
[373-12172]

UDC 577.352:591.145.2

EFFECT OF IONIC STRENGTH ON ADSORPTION OF MELITTIN FROM SOLUTION

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 4, Apr 85
(manuscript received 25 Oct 84) pp 405-410

GEVOD, V. S. and KSENZHEK, O. S., Dnepropetrovsk Institute of Chemical Technology

[Abstract] The Gibbs equation was employed in calculating melittin adsorption from air/water and air/electrolyte interfaces, in order to determine adsorption of the peptide and electrolyte under equilibrium conditions and define the structural characteristics of melittin layer in relation to ionic strength. Saturation with the melittin is seen at a concentration of 10^{-5}, and significant reduction in surface tension is obtained with concentrations as low as 5×10^{-9} M. On 1 M KCl, saturation occurs with a melittin concentration of 5×10^{-8} M. These values are three- to four-fold lower than commonly seen with standard surfactants such as sodium dodecyl sulfate. The high surface activity of melittin is attributed to electrostatic repulsion in the monolayer of the charged monomeric units at the air/water interface, or to the repulsion of charged peptide-ion complexes (tetramers) in the case of air/KCl solution interface. Figures 4; references 9: 2 Russian, 7 Western.
[373-12172]

UDC 577.352:591.145.2

INTERACTION OF MELITTIN AND FRAGMENT 8-26 WITH ANIONS AT WATER-AIR INTERFACE

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 5, May 85
(manuscript received 25 Oct 84) pp 510-515

KSENZHEK, O. S. and GEVOD, V. S., Dnepropetrovsk Institute of Chemical Technology

[Abstract] Comparative studies were conducted on the factors affecting anion binding by melittin and its 8-26 fragment at air-water interface, under concentration conditions in which both exist as tetramers in the monolayer film. Native melittin was found to form charged peptide-ion complexes with anions in the water phase, whereas the 8-26 fragment was prevented from doing so due to the absence of two hydrophobic amino acids that occur at the N-terminal end. Since the C-terminal end is identical in both molecules and is imbedded in the water phase, it is this end that is implicated in the response to changes in the ionic strength in the water phase. Studies with detergents (sodium dodecyl sulfate and dodecyl trimethylammonium bromide) showed that negatively charged molecules alter the conformation of the C-end to form an opening and allow an ingress of anions into the 'channel' formed by the four melittin monomers, whereas on reaction with a positively charged molecule in the water phase the 'channel' closes. In equimolar mixtures of melittin and its 8-26 fragment, the overall energy gain from anion ingress into the melittin tetramers is insufficient for peptide-ion complex formation. Figures 6; references 15: 3 Russian, 12 Western.
[375-12172]

UDC 577.112.5:577.152.344.042:593.65

AMINOACID SEQUENCE OF TRYPSIN INHIBITOR IV FROM RADIANTHUS MACRODACTYLUS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 3, Mar 85
(manuscript received 2 Jul 84) pp 293-301

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[Abstract] Aminoacid sequence of trypsin inhibitor--polypeptide IV--obtained during isolation of neurotoxins from actinia Radianthus macrodactylus was determined. It consists of 56 aminoacid residues, including 6 cysteine residues and none of tryptophan. Its molecular weight is 6165. The N-terminal aminoacid is glycine and the C-terminal is alanine. Figures 3; references 21: 1 Russian, 20 Western.
[1951-7813]

UDC 577.112.5:591.145.2-365

AMINOACID SEQUENCE OF NEUROTOXIN III FROM SEA ANEMONE RADIANTHUS MACRODACTYLUS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 3, Mar 85
(manuscript received 2 Jul 84) pp 302-310

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[Abstract] Four neurotoxins (RTX-1 to RTX-IV) were isolated from sea anemone Radianthus macrodactylus. The primary structure of RTX-III was investigated. This neurotoxin contains 48 amino acid residues including six cysteine and one tryptophan and has a molecular weight 5380; the N-terminal amino acid is glycine and the C-terminal is lysine. A remote homology of this primary structure with other known neurotoxins from sea anemones was shown. Figures 3; references 19: 1 Russian, 18 Western (2 by Russian authors).
[1951-7813]

UDC 519.1:547.918:615.310

STRUCTURAL INDICATORS OF ANTIOXIDATIVE AND FUNGICIDAL ACTIVITY OF STEROIDAL GLYCOSIDES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 3, Mar 85
(manuscript received 29 Mar 84; after revision 11 Jun 84) pp 408-413

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[Abstract] Results of logical-structure analysis of 70 compounds were reported aimed at finding structural characteristics responsible for antioxidative and fungicidal activity. The following factors were selected for coding individual compounds in preparation for a computer based analysis: sequence of sugars, substituents and bond types (single vs double) at various positions in the steroid molecule and stereochemical characteristics. On the basis of the computer program STRAC, the following indices were found to be responsible for antioxidant activity: an open cycle F with an attached glucose molecule to C-26 (a furostanol type aglycone), presence of more than four branched monosaccharides in the carbohydrate chain and OH groups in the aglycone. The fungicidal activity was characterized by the fragment genin-C_3-Gal-Glc-Glc-Rha... and a spirostanol type of aglycone. Figures 3; references 10: 9 Russian, 1 Western.
[1951-7813]

APPLICATION OF NEUROSCIENCES IN BRAIN STUDY

Tbilisi ZARYA VOSTOKA in Russian 23 May 85 p 3

[Article by Teymuraz Natishvili, docent, Department of Human and Animal Physiology, Tbilisi State University: "Bakuriani-85: Problems of the Brain in Light of the Neurosciences"]

[Text] The rapid development of science and technology has focused attention with new force on the problems of studying the brain. The representatives of traditional directions--neurophysiologists and psychologists, biochemists and neuromorphologists, embryologists and immunologists, as well as those of the most current directions--molecular biology, informatics and computer technology, are all engaged in the study of these questions. For the purpose of consolidating the efforts of scientists, a new scientific direction has arisen--"neuroscience." Its goal is to penetrate to the heart of the problem from the most varied theoretical orientations and experimental approaches of a general biological character.

Last year in Bakuriani the first meeting of representatives of various scientific disciplines was held in the context of the "neurosciences." It was organized at the initiative of Tbilisi State University rector and academician of the Georgian Academy of Sciences, V. Okudzhava. And once again in the spring of this year Bakuriani hosted scientists from all parts of the country.

The researchers had to meet again not only to share their new findings in the sphere of specific research, but also to define the essence of the "neurosciences" and their future. This approach was especially appropriate since this year marked the 100 anniversary of the birth of Academician I. S. Beritashvili, whose varied creativity remarkably combined a fundamental nature with the capacity for integrating new ideas and experimental approaches without disrupting the general direction toward getting to know the secret of the brain--its capacity to organize an expedient behavioral act through the psychical process of reflecting the outside world.

The representatives of every scientific discipline have their own set of working terms which reflect the conceptual and methodological "armament" which aids the specialists in their work. And, probably, still in the works of I. S. Beritashvili all these concepts and means were integrated, so to speak, along a certain channel, directed toward a perfectly clear and definite goal--getting to know the brain as an organ of the psyche which regulates our behavior. This position is the best basis for the future development of the "neurosciences." This was the theme of the first speech presented at our "Bakuriani meetings" devoted to the memory I. S. Beritashvili by Academician V. Okudzhava of the Georgian Academy of Sciences. He proposed his notion of the "neurosciences" on this basis and called for those present to bravely use all the innovations given to us by today's science: from experiments on brain transplants to the application of computer technology for processing massive experimental information as well as for planning multi-factoral behavioral experiments, etc.

The speech presented by USSR Academy of Sciences Academician P. Kostyuk, whose works have gained worldwide recognition in his field, was devoted to the latest research on a new class of so-called membrane channels of singular isolated nerve cells of vertebrates and invertebrates. Interesting reports were also presented by co-workers from his laboratory.

The speech presented by Professor L. Voronin presented data on the so-called "long-term potentiation" characteristic specifically for the cortical structures of the brain. Evidently, the cortical structures have a peculiar relation to phenomena of long-term plastic shifts, i.e., they are the most likely candidates for cerebral memory mechanisms. This important position was supported by Professor V. Skrebitskiy, who also spoke at the "meetings."

Professor A. Batuyev presented the results of experiments with recording the activity of the so-called "detector" neurons of the neocortex, i.e., the cells responding to stimuli upon irritation of the receptors only with stimuli of a strictly defined configuration.

The speech presented by Professor N. Veselkin, who works in the sphere of sensory systems study, was also of interest.

Memory and sleep: recently a decisive step has been taken in deciphering their possible neurophysiological mechanism. Academician T. Oniani of the Georgian Academy of Sciences has made an important contribution to this field with his original experiments.

The speech presented by Professor A. Veyn was devoted to the study of changes in the general structure of sleep under various conditions. It turned out that the picture of change in sleep under functional loads on the nervous system is characterized by extreme variation, which forces us to turn to modern methods of mathematical data analysis, making it possible to define a number of important shifts which may serve as the reason for occurrence of numerous illnesses. Moreover, certain cardiovascular illnesses may become exacerbated during different phases of sleep, including in the "slow", not the "dream" sleep state. This gives rise to the important practical and social conclusion drawn by A. Veyn--the necessity for developing "sleep medicine."

In the speech presented by E. Kandel, one of the pioneers of Soviet stereotaxic surgery, the participants in the "Bakuriani meeting", as they say, received "first hand" the latest information on the success of stereotaxic intervention in various, including deep-seated, structures of the brain. The in-depth analysis of the achievements in current psychosurgery presented by the speaker evoked particular interest and prompted a lively discussion among the participants.

An analysis of clinical as well as experimental information is impossible today without the application of machine methods of processing huge masses of information. Moreover, current methods of computer analysis make it possible to isolate from a multitude of unimportant details ("noise") that information which researchers need for early diagnosis of afflictions of various segments of the human central nervous system. The speech presented by USSR Academy of Medical Sciences Academician S. Khechinashvili served as a perfect illustration of the aforementioned. Based on the combined application of the computer and more traditional technique of clinical and experimental study, it was possible to perform early diagnosis of a number of illnesses.

Other interesting speeches and reports were also presented in the course of the "Bakuriani meeting." Every input by researchers into the problem of studying the brain opens up yet another secret and serves as a decisive step toward understanding the complex questions which always arise at the juncture of numerous scientific directions.

12322
CSO: 1840/364

NEUROSCIENCE CONFERENCE IN GEORGIAN SSR

Moscow IZVESTIYA in Russian 10 Jun 85 p 3

[Article by S. Tutorskaya, IZVESTIYA special correspondent, Bakuriani--Moscow: "Know Thyself"]

[Excerpts] Every year our country holds conferences on the neurosciences, which bring together researchers on [different aspects of] the brain. It is no accident that these are sponsored by scientists from Georgia. It is now generally recognized that Vazha Mikhaylovich Okudzhava, dean of Tbilisi University and academician of the Academy of Sciences, is the true inspiration and soul of these scientific gatherings. In his address, he devoted a great deal of time to the modern concept of the neurosciences. This synthesis of knowledge of the brain bequeathed us by Beritashvili includes the science of behavior and takes into consideration the needs of clinical scientists.

Physiology has now begun to involve that holy of holies, as the cell was known for many centuries, especially the nerve cell. A highly precise assortment of instruments now exists capable of bridging the cell membrane, measuring the weak currents produced in it, and studying the biochemical transformations occurring within the cell and in the intercellular spaces. Academician P. Kostyuk reported that one very important aspect of the normal functioning of a nerve cell is calcium exchange. Calcium ions, passing through the cell membrane, regulate a large number of intercellular biochemical reactions. It is by no means easy to detect the weak currents set up by the movement of these ions, but today's technology makes it possible. Studying their relations with other processes, scientists at the Physiology Institute im. A. A. Bogomolets are attempting to gain an understanding of longterm processes in the life of a nerve cell, in particular, how it not only forms a nerve impulse but also "remembers" it. If we can understand this, stated Platon Grigor'evich, we will be closer to an understanding of such an obscure phenomenon as memory.

Only by studying the human brain itself can we understand many of the processes occurring in it. Such a study is possible during therapy involving neurosurgery. We resort to such complex operations in the case of serious disturbances of mobility, pain syndromes, and other dangerous illnesses, when all other means of assistance have been exhausted. This operation, which can often save a life and restore health, at the same time offers an unparalleled opportunity to gain new knowledge of the human brain. It is possible to come within one millimeter of the desired deep brain structure, using special probing

instruments. Yet in the course of an operation we must deal with the fact that cells located in the same brain structure, at a distance of one millimeter from each other, can fulfill different functions. Confirmation is found in the fact that the control of many life processes is complex. It frequently involves not one but several structures. The surgeon invades one of the links of this chain, knowing by experience that it will bring success. But what is this chain like in its entirety? This is a question for the representatives of "fundamental" physiology.

There was also mention of the most recent research on transplanting embryonal nerve cells into the brain of a sick person. There has as yet been little research done in this area, but experiments have demonstrated that such a transplant allows the brain of the recipient to recover from oxygen starvation more quickly. In addition, the introduction of fetal brain cells into an area of spinal trauma leads to regeneration of the damaged section. This has as yet only been achieved in animal experiments.

Sleep disturbances are very commonly encountered by both neurophysiologists and physicians. Rapid-eye-movement, or R.E.M. sleep (see IZVESTIYA No 60/61) is extremely important both for information processing and for our emotional wellbeing, but scientists are focusing on the other stage of sleep, so-called slow-eye movement sleep. In this stage (which occupies three fourths of the total sleep period) a person does not dream. Yet this is the time of growth for children, in which large quantities of growth hormone are ejected into the blood stream.

Another interesting fact supports the significance of this stage. We are all aware how alcohol abuse causes severe destructive changes in the human psyche. A study of the sleep of heavy drinkers has shown that they experience a significant decrease in the relative amount of slow-eye-movement sleep. Does this mean perhaps, that its role in emotional life has not been studied adequately? Most probably. Aleksandr Noiseyevich Veyn, in his report to the conference, that the formation of a new branch of medicine, sleep medicine, was on the agenda. At present all recommendations for the treatment of diseases are based on observations of people in their waking hours. But a fair number of serious complications occur during the R.E.M. stage of sleep. This means that we must definitely study a person's condition at such times, learning to control it. Interesting information in this area is already being gathered at the clinic for nervous disorders of the First Moscow Medical Institute.

Roughly one year ago we wrote that Soviet scientists are finding quite a lot of similarities between R.E.M. sleep and wakefulness. These studies, which are being carried out under Tengiz Oniani, academician of the GSSR Academy of Sciences, are yielding results of practical interest.

Until recently it was thought that interrupting R.E.M. sleep would necessarily negatively affect the state of the memory. The method of sleep deprivation developed abroad was such that the animal, a rat, was sleeping on a small platform surrounded by water. At the onset of the R.E.M. stage, the platform was lowered and the animal found itself in the water. Oniani proposed that in such situations disruption of memory was due less to awakening than to stress. He altered the conditions of the experiment, arousing the animals indirectly, and

disvovered that such a mild transition caused no disruption of memory nor reactions of the heart and blood vessels typical of stress. Why is this important? Scientists and physicians have noted under clinical conditions that when R.E.M. sleep is interrupted in humans suffering from some nervous disorders their condition improves. New work by physiologists are making it possible to treat such patients more confidently and with greater justification.

Medical personnel were greatly interested in the report of the pathophysiologist Irina Viktorovna Ganushkina of the Neurology Institute of the USSR Academy of Medical Sciences.

One of the real wonders of nature is the barrier existing between the blood and the brain tissue. Because of the special structure of the brain membrane many compounds and cells cannot pass into the brain tissue. But during vascular diseases or trauma this barrier is destroyed. Immunological conflict may develop, and this in turn frequently leads to the development of disease processes in the brain. Until recently these phenomena were not given the attention they deserved. It is possible that their study will eventually lead to new approaches to the treatment of such a life-threatening symptom as edema of the brain.

One illustration of how a modern neurophysiological experiment may assist clinicians is a study of the prominent Georgian physiologist and clinician Semen Nikolayevich Khechiashvili, academician of the USSR Academy of Sciences. He developed a method for analyzing changes in the responses of the hearing and vestibular apparatus to stimulation. The resulting data were processed by computer. It turned out that this method can be used to reveal inflammatory processes which are usually very difficult to detect. A reliable conclusion can be drawn not only about the location of the infectious process but about its nature as well.

Important information has been obtained by Teymuraz Natishvili, scientist at Tbilisi University. Our memory, especially visual, retains information on objects and events as well as on the place to which they are related. His studies showed that these two types of information, "what" and "where", are processed in different parts of the brain.

Summarizing the events of the congress, Academician P. Kostyuk drew particular attention to the need for developing a common language and common concepts of work for representatives of all the areas of science involved in the study of the brain, neuroscience. At the Physiology Institute im. A. A. Bogomolets of the UkSSR Academy of Science, of which he is the head, this has been underway for some time. It is highly important, he noted, that physiologists maintain contact with physicians working in the clinic.

9832
CSO: 1840/1931

UDC 612.84

INTERHEMISPHERIC ASYMMETRY DURING IDENTIFICATION OF STANDARD AND NOISY TEXTURED STIMULI

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85
(manuscript received 18 Mar 83) pp 36-43

UDALOV, G. P. and KASHINA, I. A., Leningrad State University imeni A. A. Zhdanov

[Abstract] Study of the role of the right hemisphere and left hemisphere in isolating a useful signal with interference in the background involved investigation of the interhemispheric asymmetry in experiments including 19 healthy leveling machine operators (9 men and 10 women) ranging in age from 17 up to 45 years. Subjects were placed in a room on a couch with a special head hold with eyes 70 cm from a screen with a dot in the center for fixing the glance and viewed slides containing one of 4 geometric figures (square, circle, rhombus, trapezoid) against a background of additive Gaussian noise. Functional interhemispheric asymmetry is not evident, as a rule, upon unilateral tachistoscopic presentation of the textural geometric figures against a background of additive Gaussian noise. Reduction of the percent of correct responses and increase of the time of proper motor reaction accompanies decrease of differences between the statistical characteristics of the figure and the background. Right-hemispheric domination is seen upon identification of images of a square and circle with additive noise while recognition of a trapezoid and rhombus is accompanied by hemispheric symmetry or left-hemispheric functional interhemispheric asymmetry. The degree of pronouncement and the sign of functional interhemispheric asymmetry upon recognition of the geometric figures with additive noise depend on specific characteristics of the visual stimulus, the interference level and the sex of the subject. Figures 3; references 21: 13 Russian, 8 Western.
[1943-2791]

UDC 616.13-014.6+616.89-008.91:612.115

EFFECT OF EMOTIONAL STRESS ON HEMOSTASIS SYSTEM OF HEALTHY PERSONS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85
(manuscript received 18 Nov 83) pp 79-82

SOKOLOV, Ye. I., KHOVANSKAYA, T. P., NOVIKOV, I. V. and BALUDA, M. V.,
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[Abstract] Study of the effect of emotional stress on activity of the sympatho-adrenal system and of some indicators of the system of thrombocytic-vascular and plasma links of hemostasis involved participation of 35 practically healthy males ranging in age from 20-29 years with modeling of emotional stress by a method of verbal counting under conditions of shortage of time, interferences, threats of electric shock in case of errors being committed, appearance of strong and unexpected stimuli and false reports to the subjects concerning results of their performance. Urine and blood samples were taken 1 hour before start of the 1 hour study, with the subject at rest, and immediately after conclusion of tests. Emotional stress of the subjects caused increase of catecholamines in the blood and increase of excretion of them in the urine and activation of the anti-coagulation system and increase of the blood heparin level while the fibrinolytic activity increased and the fibrogen concentration in the blood decreased. Thromboelastograms recorded in the first phase of coagulation showed a tendency toward hypocoagulation in the subjects, under emotional stress. Emotional stress produced a tendency toward an increase of heparin tolerance of the plasma but did not change the ADP-induced aggregation of thrombocytes. References 14: 9 Russian, 5 Western.
[1943-2791]

UDC 612.1+613.73

ASSESSMENT OF STATE OF CHRONOTROPIC AND INOTROPIC HEART FUNCTION AT DIFFERENT DEGREES OF PHYSICAL FITNESS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85
(manuscript received 13 Jul 83) pp 96-101

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[Abstract] Problems concerning adaptation of the body to physical exertion are attracting the attention of sports medicine and space medicine researchers more and more. Physical fitness may be defined as the potential capacity of the body to adapt efficiently to physical exertion. Crews on long space flights perform regular vigorous physical exercise to preserve a high level of physical fitness as one method of preventing ill effects from weightlessness. This paper describes new methods of mathematical analysis of heart signals which permit assessment of chronotropic and inotropic heart function in a systems approach and use of the findings to evaluate physical fitness in sports medicine and space medicine. Synchronous recording of EKG with the subjects at

rest was performed for 2-3 minutes to obtain 100-120 readings of the heart rate and these data were processed on a YeS-1022 computer. The study included 2 groups of healthy males ranging in age from 20-24 years. Group 1 subjects (11 persons) were well trained, middle-distance runners and group 2 subjects (12 persons) had a fitness level achieved from the physical culture activities offered in the school program. This method proved to be an effective means of assessing physical fitness in terms of the readiness of regulatory systems to ensure the high level of functioning of the body required during great physical exertion. Under space flight conditions, it is difficult to differentiate the state of regulatory systems in connection with any kind of specific component of the functional state. The results of this study may be accepted as a first step to evaluation of the physical fitness of cosmonauts in flight while considering the complex nature of changes observed under the effect of extreme factors encountered in space flight. Results of comparative retrospective analyses of data from studies of members of the first flight of "Salyut-5" and the fifth flight of "Salyut-6" are presented and discussed. Figures 2; references 13 (Russian).
[1943-2791]

UDC 612.821

CAPACITY FOR WORK AND HEMODYNAMICS IN MALES RESIDING AT MIDDLE AND HIGH LATITUDES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85 (manuscript received 27 Jun 83) pp 113-120

MATVEYEV, L. N., Moscow Medical Stomatological Institute

[Abstract] Study of reaction of the cardiovascular system to physical exertion of various intensity involved examination of 112 males of the Northeast (mean age 32.6±0.59 years) and of 50 men residing in Moscow (31.0±0.77 years). Men in the Northeast were classified according to length of stay in the North and were placed in 1 of 4 groups: 1--stay of up to 5 years (24), 2--stay of 5-10 years (41), 3--stay of more than 10 years, 4--non-indigenous males born in the North (15 men). Fitness for physical work of non-indigenous population of the Northeast is closely associated with length of stay in the North. Performance of work analogous to that performed by men from Moscow produces a significant hyperergic reaction of the cardovascular system, possibly due to the increasing energy expenditure on muscle contraction. Persons staying in the North for up to 5 years have the capacity to ensure adequate metabolic requirements by hyperdynamia which provides adequate capacity for physical work and rapid recovery rates but a stay of more than 5 years is accompanied by lesser capacity for physical work and slowing of recovery rates, due to an approach to the limits of adaptational capacities of the cardiovascular system. Men born in the North have some limitation on their capacity for physical work but have rather rapid recovery rates, indicating a whole complex of adaptational changes. References 25 (Russian).
[1943-2791]

UDC 612.014.4:615.851.111

INDIVIDUAL TYPOLOGICAL FEATURES OF AUTONOMIC REACTIONS DURING AUTOGENIC TRAINING IN POLAR EXPEDITION MEMBERS IN PERIOD OF WINTERING IN ANTARCTICA

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85
(manuscript received 5 Nov 83) pp 121-128

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[Abstract] Subjects (20 male, healthy, polar expedition members, mean age 32 years) at the coastal Antarctic station Molodeshnaya underwent autotraining sessions in individual rooms, seated in a comfortable position. Physiological parameters of the subjects were recorded for 5 minutes and then, upon command, they tried to relax in a 2-minute period by voluntary modification of their psychophysiological state. Autotraining sessions were conducted once every 2 months. Autotraining sessions to achieve relaxation were most effective in the expedition members with average or low level of adaptive plasticity, beginning in the second half of wintering at the station. Intersystem interrelationships of central and peripheral links for providing adaptive reconstructions during autotraining of the expedition members depended on individual parameters of cerebral neurodynamics. Autotraining proved to be an adequate non-medicinal method for preventing and correcting disadaptational disturbances in the expedition members during their stay in Antarctica. Individual differences in the plasticity of neurodynamic processes determine the nature of autonomic reactions of the body to autotraining. Figures 3; references 13 (Russian).
[1943-2791]

UDC 612.05.6:613.6:213.5

EFFECT OF INCLUSION OF SUPPLEMENTARY ASCORBIC ACID IN DAILY DIET ON DEGREE OF VITAMIN SATURATION OF BODY AND THERMORESISTANCE OF ERYTHROCYTES WHILE WORKING IN ARID ZONE

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85
(manuscript received 6 Jan 84) pp 129-133

MOMMADOV, I. M., GRAFOVA, V. A. and TUPIKOVA, G. A., Institute of Physiology and Experimental Pathology of the Arid Zone, TSSR Academy of Sciences, Ashkhabad

[Abstract] Study of the physiological needs for ascorbic acid and of the effect of vitamin C supplements at the rate of 150 mg/day on the resistance to heat in men working in arid zones involved 12 construction workers (ranging in age from 18 to 29 years), employed on a sovkhoz in the area of the Kara-Kum canal. Ascorbic acid sufficiency was determined by its level in the morning urine of the fasting subjects, by a method developed at the Donetsk Scientific Research Institute of Labor Hygiene and Occupational Diseases. Subjects ate a dragee containing 50 mg of ascorbic acid 3 times a day immediately after meals and this increased the vitamin C level in the morning urine of the fasting workers

by 0.78±0.12 mg, on the average. The 150 mg/day dosage normalized the ascorbic acid level in the workers' organism. The vitamin C supplement increases man's erythrocytes resistance to heat when working in high temperatures with high insolation. References 19: 14 Russian, 5 Western.
[1943-2791]

UDC 612.015.6:613.12

EFFECT OF VARIOUS DOSES OF SOME VITAMINS ON NON-SPECIFIC MECHANISMS OF ADAPTATION OF MAN

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85
(manuscript received 25 Sep 84) pp 134-137

NOVIKOV, V. S. and BORTNOVSKIY, V. N., Military Medical Academy imeni S. M. Kirov, Leningrad

[Abstract] Study of the effect of vitamin supplements on the state of the blood system and nonspecific resistance of persons working under adverse conditions involved observations of 30 operators ranging in age from 19 up to 30 years, working under very stressful conditions involving hypokinesia in uncomfortable surroundings. Against a background of adequate nutrition, 10 subjects (group 1) received vitamin supplements systematically for 2 months; 10 subjects (group 2) received a double dose of the same supplements and 10 subjects (control group) received a placebo. Subjects were observed before beginning work under these adverse conditions and after 1 month and 2 months working under these conditions. The study showed the direct dependence of functioning of protective systems of the body on provision of adequate vitamins to the organism. Vitamin sufficiency is quite important in order to increase general resistance, normalize the state of the internal bodily environment and to correct possible disturbances of protective functions of the body. Figures 3; references 16 (Russian).
[1943-2791]

UDC 612.822.3:612.821:612.824

FEATURES OF SENSOMOTOR REACTIONS AND RHEOENCEPHALOGRAMS IN PERSONS WITH DESYNCHRONIZED TYPE OF EEG

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 1, Jan-Feb 85
(manuscript received 19 Sep 84) pp 161-163

RUSNAK, V. G., "DONBASSENERGO" Industrial Energy Association, Gorlovka

[Abstract] An attempt to reveal specific features of basic properties of the nervous system and cerebral hemodynamics in persons with a "flat" EEG type "511123" involved observation and study of thermoelectric power plant operators including 20 persons with the desynchronous type of EEG (code "511123") and 30 persons with EEG organized in relation to space and time (code "233211") in a control group. Persons with variant "511123" EEG had weaker nervous processes

in relation to excitation and rate of sensomotor reactions but displayed no change in lability of the nervous system while persistent weakening of alpha-activity was accompanied by an increase of tonus of the cerebral vessels. References 8 (Russian).
[1943-2791]

UDC 613.11(99)+614.2

ADAPTATION OF MAN TO EXTREME CONDITIONS OF ANTARCTIC

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 10, No 6, Nov-Dec 84
(manuscript received 8 Feb 84) pp 907-920

SOROKO, S. I., MATUSOV, A. L. and SIDOROV, Yu. A., Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad

[Abstract] Summarization of medical and biological studies carried out during several Antarctic expeditions, with participation of the authors, shows that the totality of extreme factors faced in the Antarctic places increased demands on the nervous, autonomic and psychoemotional systems of man, calling for mobilization of all reserve possibilities of the organism. Adaptation of man to this region involves reconstruction of basic functional systems with some features differing from those encountered during adaptation to other geographical and climatic zones. Wintering in the Antarctic is accompanied by development of a special functional state of the organism characterized by: increase of sensitivity of sensory systems, shift of the EEG frequency spectrum to lower frequencies and reconstruction of the EEG structural pattern, reduction of the reserve of resistance of regulatory systems of the brain with reduction of the range of regulation and an increase of its inertness, increase of emotional stress with increase of neurotic tendencies, reconstruction of the autonomic status, reduction of physical capacity to work and disturbance of mnestic functions and general asthenization of the organism. Complete adaptation to Antarctic conditions does not occur in 1 year and the rate of adaptation depends upon the plasticity of neurodynamic processes in the individual, information about which may be used in selecting personnel for duty in the Antarctic. The USSR Academy of Medical Sciences Institute of Experimental Medicine is one of the first institutions to participate actively in planned studies of adaptation of man in the Antarctic. The director of and inspiration for these studies is Director of the institute, Academician USSR Academy of Medical Sciences Dmitriy Andreyevich Biryukov, who headed the commission created by the USSR Ministry of Health in 1966 "Acclimatization of Man in the Antarctic". As one of the founders of ecological physiology, Biryukov emphasized that knowledge of the interaction of the organism with the external environment and their unity may be obtained only by ecological studies, preferable under natural conditions. The very first medical studies conducted during polar expeditions showed that the extreme conditions existing in the Antarctic make it possible to discover more details about adaptational possibilities, limits of functional reserves, mechanisms of compensation and development of pathology. Its natural isolation and the abiogenicity of the external environment make the Antarctic a natural laboratory for study of many problems of space biology and medicine. Figures 5; references 37: 29 Russian, 8 Western.
[1941-2791]

UDC 612.172:612.766.1

INDIVIDUAL TYPOLOGICAL SELF-REGULATION OF CARDIO-VASCULAR SYSTEM

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 10, No 6, Nov-Dec 84
(manuscript received 25 Jan 84) pp 929-936

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[Abstract] New data relating to characteristics of individual typological features of purposeful self-regulation of heart rate and arterial blood pressure in a tracking regime with visual feedback involving 5 physically fit subjects ranging in age from 24 up to 28 years were described and discussed. Individual differences in delaying influences from baroreceptors at different levels of regulation of the central nervous system, being manifested in different amplitude-phase characteristics of the imposed fluctuations of heart rhythm and blood pressure according to a sinusoidal control signal create preconditions for determining individual features of self-regulation and endogeneous biorhythms in the central nervous system of man. There occur differences of interdependence of the range of extremes of the phase-amplitude characteristics of the imposed fluctuations and the time of simple motor reaction, mediated by the relationship of the sympathetic and parasympathetic mechanisms of regulation of psychophysiological functions. The study justifies the conclusion that the method of self-regulation of parameters of the functional state of the cardio-vascular system permits a several-fold increase of amplitude of voluntary fluctuations of the heart rate and may be used as training for sign-variable loading and for study of the possibility of destabilization of biological systems in order to transfer them into a new functional state.
Figures 3; references 36: 32 Russian, 4 Western.
[1941-2791]

UDC 612.821.7

RELATIONSHIP BETWEEN CHARACTERISTICS OF PRE-STIMULUS EEG AND EXTREME TIME OF SENSOMOTOR REACTION

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 10, No 6, Nov-Dec 84
(manuscript received 26 Apr 83) pp 951-958

KOROLKOVA, T. A., TRUSH, V. D., KORINEVSKIY, A. V., VASILYEV, Ya. A. and OSTROVSKAYA, Ye. E., Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow

[Abstract] Study of the functional significance of spectral-correlation parameters of pre-stimulus EEG's for reaction time of man involved investigation of these parameters before reactions with the shortest latent period. Comparison of the aggregate of spectral-correlation parameters of cortical potentials in the pre-stimulus period of motor reactions of man with extreme values of the latent period was performed with the aid of practically healthy subjects ranging in age from 18 up to 59 years. More than 5000 stimuli were given to 16 subjects during 80 investigations and 2500 of these were analyzed

as cases in which the subject reacted with extreme reaction time. The most informative indicator during a 4-5 second extent of analysis is the power spectrum of potentials of the neocortex, in which period the level of overall reaction of the brain is reflected. Comparison of the coherence function shows different directional changes of these functions in the band of low and high frequencies before reactions with extreme values of the latent period. Comparison of cross-correlation coefficients between potentials of the regions of the brain studied shows variability of cross-correlation relationships in each of the following experiments. It is assumed that this inconstancy is caused by the high dependence of the cross-correlation coefficients on many factors which do not affect isolation of extreme values of reaction time of man directly. Figures 4; references 15: 13 Russian, 2 Western.
[1941-2791]

UDC 612.84

FEATURES OF INFORMATION PROCESSING BY RIGHT AND LEFT CEREBRAL HEMISPHERES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 10, No 6, Nov-Dec 84
(manuscript received 30 May 83) pp 959-964

DODONOVA, N. A., ZALTSMAN, A. G. and MEERSON, Ya. A., Leningrad Scientific Research Psychoneurological Institute imeni V. M. Bekhterev

[Abstract] Explanation of differences of activity of the cerebral hemispheres during solution of problems arising in visual searches under training conditions was based on data obtained from responses of two 35 year-old subjects undergoing 18 experiments consisting of 5 series (7000 presentations). Geometric figures of the same size were used as stimuli. Data obtained disagree with the traditional data of the leading role of the left hemisphere in sequential processing of information and of the right hemisphere in parallel processing of information. Sequential processing of information prevails in both hemispheres during visual search without preliminary training and this changes to parallel processing in the left hemisphere in proportion to training. After training, information processing time after its presentation in the left hemisphere is no longer dependent upon the length of the row of figures presented while such a dependence remains upon presentation in the right hemisphere. Structures of the left hemisphere play a predominant role in training processes. Training results in formation of generalized distinctive characters, consideration of which ensures more economical and better means of solving visual-perception problems. Figures 3; references 19: 5 Russian, 14 Western.
[1941-2791]

UDC 612.17+612.24:656.2-057.2

CONDITIONING POTENTIALITIES OF RESPIRATORY APPARATUS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 10, No 6, Nov-Dec 84
(manuscript received 11 May 83) pp 981-987

AGARKOV, F. T., Donetsk State Medical Institute

[Abstract] Study of more than 1500 healthy adults involved recording of the temperature of expired alveolar air by them and their sublingual, axillary and rectal temperature with temperature of the environment at -30 up to +30°C and at +50, +60 and +70°C in a heat chamber. Temperature of expired alveolar air at the height of maximally deep exhalation has the same values (34.7+0.03°C) only in a limited indifferent range of the external environment but at subcomfortable and supercomfortable temperature it remains at a stable higher or lower level (by 0.1-1.2°C). Heat or cold, disturbing the isothermy, caused destabilization and an increasing change of the temperature of exhaled alveolar air. Exogenous heat effects which disturb isothermy of the organism destabilize the temperature of the alveolar air. Factors which limit the conditioning potentials of the respiratory apparatus in the presence of intense heat include the air temperature, the air humidity and developing hypothermia, the degree of pronouncement of which determines the degree of increase of temperature of the alveolar air, to the greatest extent. It is assumed that the respiratory apparatus is not an ideal conditioner and the existing idea about the "constancy" and the conformity of the temperature of the alveolar air to the temperature of the "core" of the body must be reconsidered. Figures 2; references 38: 25 Russian, 13 Western.
[1941-2791]

UDC 612.3 + 612.5 + 612.8

PHYSIOLOGICAL EFFECTS OF BOMBESIN

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 2, Feb 85 (manuscript received 14 Sep 84) pp 145-170

KLIMOV, P. K., MAR'YANOVICH, A. T., POLYAKOV, Ye. L., KURANOVA, I. L. and CHURKINA, S. I., Department of Normal Physiology (Director V. I. Medevedev), Military Medical Academy imeni S. M. Kirov, Leningrad; Laboratory of the Physiology of Digestion (Director P. K. Klimov), Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad; Department of Natural Products Chemistry (Director V. F. Martynov), Leningrad State University imeni A. A. Zhdanov, Leningrad

[Abstract] This review has dealt with the topic of bombesin only, because of the paucity of data in domestic literature on its physiological effects. Bombesin, a tetradecapeptide, was isolated by Italians in 1970 from the European frog Bombina bombina where it was found along with other bombesin-like peptides. Bombesin-like peptides are found in many mammals. Two subspecies were identified differing by the C-terminal tripeptide: His-Leu-Met-NH_2 and His-Phe-Met-NH_2. Physiological activity of bombesin causes depolarization of motoneurons, intensifies the activity of pyramidal cells in the brain, alters nutrional behavior, locomotive activity, stimulates production of growth hormone, prolactin and the follicle-stimulating hormone. Many of these bombesin

peptides have now been synthesized. The following topics are reported in greater detail: effect of bombesin on CNS, hypophysis, behavioral patterns, its effect on thermoregulation and its localization. A special subtopic covers the effects of bombesin on digestive organs: gastric secretions, pancreas and other organs. References 119: 10 Russian, 109 Western.
[1946-7813]

UDC 612.338 + 612.57

SHORT TERM HEAT EFFECT ON ADRENO- AND CHOLINO- SENSITIVITY OF RAT'S SMALL INTESTINE

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 2, Feb 85 (manuscript received 22 Dec 83) pp 195-199

MEZIDOVA, Kh. A., MANUKHIN, B. N. and SULTANOV, F. F., Laboratory of Physiology (Director B. N. Manukhin), Institute of Developmental Biology imeni N. K.. Kol'tsov, USSR Academy of Sciences, Moscow

[Abstract] The dynamics of adreno- and choline-sensitivity of the smooth muscles of rat's small intestine were studied at various times after an exposure of the experimental animals using white Wistar rats to 45°C for 30 or 60 minutes. The body temperature of test animals increased rapidly under the influence of the external temperature. Sensitivity of the intestine to noradrenaline also increased under conditions of hyperthermia, following the pattern of body temperature. Sensitivity to acetylcholine was expressed less markedly; initial heating resulted in a slight decrease followed by an increase after a 1 hr exposure; after termination of the experiment, the sensitivity remained below that of control values for about five days. Thus it was shown that changes in adrenoreceptor sensitivity could be controlled by as non-specific a factor as the altering of environmental temperature. Figures 2; references 20: 16 Russian, 4 Western.
[1946-7813]

UDC 612.32

EFFECT OF NATURAL NEUROTENSIN AND ITS ANALOGUE ON STOMACH SECRETIONS AND ON CONCENTRATION OF SOME PEPTIDES IN DOG'S BLOOD

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 2, Feb 85 (manuscript received 6 Jul 84) pp 200-205

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[Abstract] Effect of neurotensin and its analogue DTr"-neurotensin on gastric secretion of dogs after their intravenous administration was studied along with their effect on the level of serum gastrin, plasma neurotensin and the substance P. Stomach secretions induced by pentagastrin were decreased substantially. The secretions induced by histamine were not affected. The plasma

levels of gastrin, neurotensin and the substance P became elevated under these experimental conditions. The neurotensin was active at levels above 50 µg/µl. Microapplication of neurotensin to the globus pallidus with concurrent administration of histamine increased serum levels of gastrin. It was concluded that the effect of neurotensin on the secretion of HCl occurred, most probably, by the histamine-gastrin-dependent route. Figures 5; references 14: 3 Russian, 11 Western.
[1946-7813]

UDC 612.32 + 612.826

EFFECT OF SOMATOSTATIN ON NEUROSECRETORY CELLS OF PARAVENTRICULAR NUCLEUS OF HYPOTHALAMUS AND ARGENTAFFINIC CELLS OF ANTRAL PART OF RAT'S STOMACH

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian
Vol 71, No 2, Feb 85 (manuscript received 24 May 84) pp 206-212

KOTEL'NIKOVA, V. I., CHERNYSHEVA, M. P., LUTSIK, Ye. A., MILEYKOVSKIY, B. Yu., ARDAMASOVA, Z. A., SHVACHKIN, Yu. P., SMIRNOVA, A. P., ZAVALISHINA, N. A. and SHISHKINA, Yu. N., Laboratory of Digestive Physiology (Director P. K. Kilmov), Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences; Division of Nerve-Visceral Functions [Director I. I. Grachev (Deceased)], State University imeni A. A. Zhdanov, Leningrad; Laboratory of Protein Hormone Chemistry (Director Yu. P. Shvachkin), Institute of Experimental Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow

[Abstract] Somatostatin has been shown to inhibit many secretory processes. In the present paper effects of intracerebral administration of somatostatin on the electric activity of paraventricular nucleus and stem structures was studied along with secretory activity of argentaffinic cells of the central part of rat's stomach using highly inbred "Bag" male rats. All antral and peripheral structures exhibited changed activity upon administration of somatostatin. Neuronal activity in the paraventricular nucleus decreased and the amount of argentaffinic cells was reduced sharply suggesting an active release of enterochromaffinic cell granules into the blood. Evidently the neuropeptide released by central somatostatin containing neuron populations may show an effect on higher vegetative centers and their functional interrelations. Figures 3; references 13: 3 Russian, 10 Western.
[1946-7813]

UDC 612.32 + 612.826

EFFECT OF SOMATOSTATIN ON MYOELECTRICAL ACTIVITY OF STOMACH AND SMALL INTESTINE IN CONSCIOUS DOGS AND RABBITS

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I M. SECHENOV in Russian Vol 71, No 2, Feb 85 (manuscript received 4 Nov 83) pp 213-220

OVSYANNIKOV, V. I., SHEMEROVSKIY, K. A., TKACHENKO, B. I., Khamar, Ya. and KOVACH, A. G. B., Division of Visceral Systems Physiology imeni Academician K. M. Bykov (Director B. I. Tkachenko), Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad; Experimental Division (Director A. G. B. Kovach) of the Medical Faculty, University imeni Semmelweis, Budapest

[Abstract] Somatostatin is a peptide produced by hypothalamus; it retards the release of growth hormone and can participate in regulation of digestive functions by inhibiting secretion of a number of intestinal hormones. Motor effects of various segments of gastro-intestinal tract were studied on dogs and rabbits, administering somatostatin intravenously in doses of 3.3 to 330.0 mg/kg. During the fasting period, somatostatin showed a stimulating effect in stomach, duodenum, small intestine and ileum, while during digestive process, an inhibiting effect was noted. In rabbits the inhibitory effect of somatostatin was principally on the myoelectrical activity of the stomach and small intestine. Possible mechanisms of the somatostatin effect on the contractile activity of stomach and the smooth muscles of duodenum are proposed. Figures 5; references 20: 5 Russian (1 by Western author), 15 Western. [1946-7813]

UDC 612.3

cAMP CONTENT IN BLOOD SERUM, BRAIN TISSUE, STOMACH, ADRENAL GLANDS AND DUODENUM AFTER ADMINISTRATION OF NEUROTENSIN AND CHOLECYSTOKININE

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 2, Feb 85 (manuscript received 25 Jan 84) pp 258-260

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[Abstract] Neurotensin and cholecystokinin-oxapeptide were administered intraperitoneally to male Wistar rats and the levels of cAMP were determined in brain, blood, adrenal glands, stomach and duodenum. Administration of cholecystokinin led to decreased levels of cAMP in all organs studied. Neurotensin led initially to increased levels of cAMP in blood, stomach and the duodenum, but then dropped after about 15 min. In brain and in adrenal glands a sharp increase of cAMP was noted only after 15 minutes post administration. Figure 1; references 12: 6 Russian, 6 Western. [1946-7813]

UDC 014.423. + 612.766.1:796 + 612.13

CLASSIFICATION OF CHANGES IN ELECTROCARDIOGRAM DURING MUSCULAR EXERTION OF HEALTHY INDIVIDUALS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 2, Mar-Apr 85
(manuscript received 3 May 83) pp 201-207

ZAV'YALOV, A. I., Belorussian State University, Minsk

[Abstract] The determination of human endurance during physical stress is one of the most important tasks in aviation, space, work and in sport physiology. Bodily functioning depends on the cardio-respiratory system and evaluation of the myocardium during exertion is achieved by studies of the electric activity of the heart. The dynamics of EKG was studied on 4226 subjects while applying various stress loads. Advanced athletes and sedentary individuals were examined during active exertion and in rest periods. Telemetric and conductive EKG was studied along with seismography, photoplethysmography and arterial pressure. Classifying these changes in relationship to the work performed made it possible to analyze the data statistically leading to comparative analysis of the results. Appearance of "overstress" signals on EKG was accompanied by decreased frequency of heart contractions, a drop in systolic arterial pressure, lowered blood supply, decreased amplitude of seismocardiac signals and of the photoplethysmography wave, indicating a disorder in the contractural function of the myocardium. Figure 1; references 12 (Russian).
[1944-7813]

UDC 612.84

EYE-MOVEMENT ACTIVITY AS INDEX OF FUNCTIONAL STATE OF BRAIN

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 2, Mar-Apr 85
(manuscript received 16 Nov 83) pp 235-240

KHOMSKAYA, Ye. D. and YEFIMOVA, I. V., Moscow State University imeni M. V. Lomonosov

[Abstract] Motor reactions are important indicators of the functioning of brain, especially the indicators of eye-movement reaction. There are two types of eye movements: slow or tracing movements and fast, saccadic movements with different control mechanisms. Rhythmic saccadic eye movements were studied in relationship to intellectual fatigue of students developing during the day and the emotional stress connected with examinations as well as the characteristics of eye movements in individuals with varying degree of motor activity. The results showed a definite correlation between the parameters of eye movement reactions and general motor activity of the subjects along with their functional state. Fatigue and emotional stress resulted in increased frequency of eye movements especially in the more sedentary individuals. Thus, eye movement reactions could be used as diagnostic tools in determining the functioning state of the brain. References 23: 20 Russian (1 by Western author), 3 Western.
[1944-7813]

UDC 613.166:613.863:615.739

MECHANISM OF ADAPTOGENIC ACTION OF PRICKLY ELEUTEROCOCCUS ON MAN DURING HEAT STRESS

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 2, Mar-Apr 85 (manuscript received 2 Jan 84) pp 303-306

NOVOZHILOV, G. N. and SIL'CHENKO, K. K., Military Medical Academy imeni S. M. Kirov, Leningrad

[Abstract] The use of prickly eleuterococcus extracts for 10 days prior to and during heat exposure had a positive effect on thermal regulation by lowering body temperature by 0.73°C in comparison to controls. Activation of sweat secretion which begins prior to heat exposure prepares the body to supply the energy to principal systems supporting thermal stability. After seven days of initial heat adaptation, the adaptogenic effect of eleuterococcus is expressed by more economical sweating in comparison to controls. The intensive energy exchange is achieved by mobilization of protein metabolism products as evidenced by higher consumption of protein during energy exchange and higher excretion levels of nitrogen compounds with sweat and urine. Thus, the use of eleuterococcus during 10-day heat stress led to increased thermal stability of the body and a serious strain on the nitrogen metabolism. Figures 3; references 9 (Russian).
[1944-7813]

UDC 615.832.1.015.4:612.763-08

VESTIBULAR RESISTANCE AND BLOOD CIRCULATION CHANGES IN ORTHOSTATIC POSITION DURING HYPERTHERMIA

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 2, Mar-Apr 85 (manuscript received 15 Oct 83) pp 327-330

SOBOLEVSKIY, V. I., State University of Physical Education imeni P. F. Lesgaft, Leningrad

[Abstract] Studies of vestibular and orthostatic stability of the body under various environmental conditions constitute an interesting problem in applied human physiology especially under conditions of progressive exogenic hyperthermia. Thermogenic changes of arterial pressure, volume of circulating blood and peripheral resistance were studied in gravitational and vestibular loads on 58 healthy men 19-36 years old. Exogenic hyperthermia was created by placement of the subjects in a sauna (90°C and 10-15% relative humidity) for 10, 15 and 20 minutes. The study showed that with limited internal hyperthermia (sublingual temperature change $\Delta T_s \leq 0.6°C$ and loss of humidity $\Delta M \leq 0.31\%$) the vestibular and orthostatic stabilities of men were unaffected. A break in vestibular tolerance and compensation of orthostatic effect occurred at $\Delta T_s \geq 1.4°C$ and $\Delta M \geq 1.2\%$. One of the principal mechanisms of lowering

resistance to vestibular and gravitational irritants was the disturbance in the blood circulating system and in cardiac activity. Figures 2; references 9: 8 Russian, 1 Western.
[1944-7813]

UDC 612.745:621.384.3.39.61

HEAT TRANSFER MECHANISM IN HUMAN EXTREMITIES

Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 11, No 2, Mar-Apr 85 (manuscript received 8 Jul 83) pp 336-338

RAYGORODSKAYA, T. G., KOSHELEV, V. N. and PERTSOV, O. L., State Optical Institute imeni S. I. Vavilov, Leningrad

[Abstract] The goal of this study was to evaluate and separate the effects of conductive and convective factors of heat transfer on the dynamics of the formation of temperature field of the skin of lower extremities during muscular exertion using a previously developed mathematical model. The study was carried out on six volunteers. It was shown that during the process of heat transfer from deep muscles towards the surface of the limb, the role of heat conductivity was insignificant. The principal spread of heat in the tissue and its transfer to the surface occurred by means of the convective route. Specific routes of heat transfer from the depth to the surface and quantitation of the convective heat transfer require further studies. Figures 3; references 11: 5 Russian (1 by Western authors), 6 Western.
[1944-7813]

UDC 612.22/27

REACTION OF RABBIT RESPIRATION SYSTEM TO HYPOXIC STIMULUS IN NITROGEN-OXYGEN MEDIUM AT ELEVATED PRESSURE

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 3, Mar 85 (manuscript received 2 Dec 83) pp 316-319

DONINA, Zh. A., Hyperbaric Physiology Group (Leader G. V. Troshikhin), Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] Respiratory changes in exposed animals to increasing hypoxia was investigated on 9 rabbits under normal conditions and in nitrogen-oxygen mixture at elevated pressure. While remaining at atmospheric pressure in air, the oxygen pressure in arterial blood dropped gradually during recycled breathing from a bag, resulting in lung ventilation. The largest increase in respiratory volume was observed when oxygen pressure in blood dropped to 44.9 mm Hg; this occurred while the respiration became deeper and more frequent. During hyperbaria, the frequency of breathing decreased while the depth of the respiration increased. The increase in respiratory volume and lung ventilation was accompanied by increased pressure in the lungs and by more labored breathing. Figure 1; references 10: 6 Russian (1 by Western author), 4 Western.
[1948-7813]

UDC 612.23

INDICES OF BLOOD OXYGEN TRANSPORTING PROPERTIES AND ERYTHROPOIESIS IN RATS AFTER PROLONGED STAY IN NITROGEN-OXYGEN MIXTURE AT ELEVATED PRESSURE

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 3, Mar 85 (manuscript received 13 Mar 84) pp 320-323

VOLZHSKAYA, A. M., TROSHIKHIN, G. V. and SHUMILOVA, T. Ye., Laboratory of Transport Functions of Blood (Director Yu. Ya. Kislyakov) and Hyperbaric Physiology Group (Leader G. V. Troshikhin), Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] Oxygen supply to the body becomes inadequate under elevated pressures because of the action of a series of unfavorable effects on the respiratory system, the blood and blood circulating system. The goal of the present study was to investigate principal blood indices determining their oxygen transport properties and the intensity of erythropoiesis in rats exposed for different times to elevated pressure in a mixed nitrogen-oxygen atmosphere. After decompression, the animals showed increased concentration of hemoglobin, elevated levels of hematocrit and higher quantities of erythrocytes, which persisted for 4 hrs; after 24 hrs the values returned to normal. The concentration of 2,3-diphosphoglycerate in erythrocytes increased markedly and remained that way for 72 hrs. The erythropoietic activity was intensified through the 72 hrs of the experiment. These data indicate mechanisms aimed at improving delivery of oxygen to the tissue and representing compensatory reactions to hypoxia. Figures 2; references 12: 8 Russian, 4 Western.
[1948-7813]

UDC 612.017.2:015.33.12

HOMOCARNOSIN IN RAT BRAIN DURING ADAPTATION TO COLD

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 3, Mar 85 (manuscript received 20 Jan 84) pp 333-336

BONDARENKO, T. I., KRICHEVSKAYA, A. A. and KOSHCHIY, G. N., Department of Biochemistry (Director A. A. Krichevskaya), State University, Rostov-na-Donu

[Abstract] Homocarnosin (γ-aminobutyryl-l-histidine) is a peptide neuromediator of the central nervous system; its content in white rat brain was studied during cold adaptation process (+2 to +4° C) lasting from 1 to 45 days. The results showed that the homocarnosin level dropped progressively with exposure to this temperature. During the stress period (1-3 days), peroxide oxidation intensified and the hemoglobin in serum was elevated. Stimulation of the peroxide oxidation damaged some enzymes and the structure of the membranes and some of their properties were altered. Adaptation time to the cold varied in different animals; in rats it was achieved in 45 days. At that time the level of homocarnosin in cold-adapted animals was lower by some 56% as compared to controls. The exposure to low temperature led to decrease in homocarnosin-carnosynthetase activity which explained the lower levels of homocarnosin in cold adapted animals. References 20: 18 Russian, 2 Western.
[1948-7813]

UDC 612.592.1 + 745.4

EFFICIENCY OF MUSCULAR WORK IN WHITE RATS DURING ADAPTATION TO COLD

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 3, Mar 85 (manuscript received 18 Oct 83) pp 337-341

TKACHENKO, Ye. Ya. and YAKIMENKO, M. A., Laboratory of Thermoregulation (Director M. A. Yakimenko), Institute of Clinical and Experimental Medicine, Siberian Department of USSR Academy of Medical Sciences, Novosibirsk

[Abstract] The goal of this work was to investigate the relationship between heat production and work performed under various work loads by muscles of adult rats adapted to a cold medium to determine the maximum of work ability and its energetic optimum. Temperature increase in the contracting muscle per unit work ($\Delta t/A$) was plotted as a function of the magnitude of completed work by cold-adapted and control rats. The data showed that work effectiveness changed with adaptation to cold: optimum performance was achieved by cold-adapted animals with loads of 200-250 g as compared to controls which showed a 320-380 g loads. Figures 3; references 16: 14 Russian (1 by Western author), 2 Western.
[1948-7813]

UDC 612.53/59 + 821.7

INTRADIURNIAL ORGANIZATION OF 'WAKEFULNESS-SLEEP' SEQUENCE AND ENERGY METABOLISM IN RATS EXPOSED TO LOW AMBIENT TEMPERATURE

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 3, Mar 85 (manuscript received 16 Nov 83) pp 342-347

SAZONOV, V. S. and PASTUKHOV, Yu. F., Laboratory of Physiology of Natural Adaptation (Chief Yu. F. Pastukhov), Institute of Biological Problems of the North, Far Eastern Scientific Center, USSR Academy of Sciences, Magadan

[Abstract] Sleep characteristics were studied in time as a function of energy exchange under conditions of acute and chronic exposure to low ambient temperature. Two sleep phases were identified in all animals regardless of the temperature: slow wave sleep, further subdivided into surface and deep subgroups, and paradoxical sleep. In all, three control rats were used and five cold-adapted ones. At low ambient temperature, controls had a lighter, shorter and often interrupted sleep. After cold adaptation (3-6 weeks at 6°C), daily sleeping period increased both at low and ambient temperatures. An assumption was made that, after prolonged cold, the sleep initiation mechanisms continued to be active, while those of the sleep development were arrested. Figures 2; references 19: 5 Russian, 14 Western.
[1948-7813]

UDC 612.014.421

TV MONITORING CONTROL SYSTEM IN ELECTROPHYSIOLOGICAL STUDIES

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 3, Mar 85 (manuscript received 27 Mar 84) pp 381-383

KRATIN, Yu. G., POPECHITELEV, Ye. P., SOLOV'YEV, A. N. and BUCH, Yu. I., Laboratory of Neurophysiology (Director Yu. G. Kratin), Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences; Department of Biomedical Electronics and Environmental Protection (Director V. M. Akhutin), Electrotechnical Institute imeni V. I. Ul'yanov (Lenin), Leningrad

[Abstract] In electrophysiological experiments and during determination of EEG curves, the flow of information must be filtered to isolate most important indices so as to be able to follow the functional state of the brain of the subjects being studied. A special monitor was constructed for this purpose. It consists of a TV camera, video-control unit (TV "Elektronika Ts-430") and an image synthesizer consisting of synchronous impulse selector, round figure constructor and a coloring block. The degree of brain activation is converted to the background color scheme, making it possible to study the subject concurrently with the observation of brain activation. This apparatus could easily be modified for other clinical applications. Figure 1; references: 6 (Russian)
[1948-7813]

UDC 612.58

EFFECT OF COLD ON BRAIN SEROTONIN SYSTEM AND PLASMA CORTICOSTEROID LEVEL IN DIFFERENT STRAINS OF MICE

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 71, No 4, Apr 85 (manuscript received 29 Feb 84) pp 422-427

KORYAKINA, L. A., KULIKOV, A. V., FIGUROVA, M. Yu. and POPOVA, N. K., Laboratory of Behavioral Phenogenetics (Chief: Popova, N. K.), Institute of Cytology and Genetics, Siberian Department of USSR Academy of Sciences, Novosibirsk

[Abstract] The serotonin system in the brain plays an important role in central reaction mechanisms of the body towards cold reaction because serotonin participates in central regulation of hypothalamus-adrenal and thermoregulating systems. The goal of this study was to evaluate the activity of tryptophan hydroxylase (an important enzyme in biosynthesis of serotonin) in brain and to determine the plasma corticosteroid levels in male mice while they were exposed to +4°C for 1 or 6 hrs. It was shown that the activity of tryptophan hydroxylase dropped during the cooling process, leading to an assumption that the activity of the entire serotonin system in brain became lowered. Decreased synthesis of serotonin supported temperature homeostasis and thus increased the resistance of animsls to cold. These changes in the serotonin system were of

an adaptive nature. In present experiments no linear relationship was noted between the degree of activation of hypothalamo-hypophyseal-adrenal systems and the drop in body temperature of the experimental animals. Overall, an assumption is expressed that the observed changes in the synthesis of biogenic amine represent a specific reaction of the body to the cooling process and are caused by participation of brain serotonin in central thermoregulation. Figures 2; references 21: 11 Russian, 10 Western.
[1950-7813]

UDC 612.273

DYNAMICS OF GENERAL RESISTANCE OF RATS DURING READAPTATION PERIOD AFTER TRAINING IN ALTERED GAS ENVIRONMENT

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian
Vol 71, No 4, Apr 85 (manuscript received 1 Dec 83) pp 523-526

ZVER'KOVA, Ye. Ye., Laboratory of General Physiology (Chief S. B. Isabekova), Institute of Physiology, KazSSR Academy of Sciences, Alma-Ata

[Abstract] The duration of retained resistance of animals to external conditions was studied on 330 white rats as a function of adaptive training and specific conditions of altered gas medium. The adaptation training to combined hypoxia and hypercapnia or to "pure" hypoxia lasted 15 and 30 days for each modality. It was shown that a 15-day training by either of above methods had an insignificant effect on high altitude resistance. The animals exposed to 30 day treatment showed significant increase in resistance to acute hypoxia. The high altitude resistance was higher at all times in the groups exposed to a combination of hypoxia and hypercapnia training. This type of resistance lasted for up to 60 days after the readaptation period. Figure 1; references 12: 10 Russian, 2 Western.
[1950-7813]

INTERNATIONAL EXPOSITION ON ACHIEVEMENTS IN PUBLIC HEALTH

Moscow SOVETSKAYA KULTURA in Russian 15 Jun 85 p 1

[Article: "Peace and Health to the People"]

[Text] Recently the international exposition "Public Health 85" was concluded. Over 400 companies from over 20 foreign countries participated in it. Hundreds of thousands of visitors attended the exposition--doctors, scientific workers, and designers developing medical instruments and technology. Our correspondent M. Yarovinskiy asked USSR Deputy Minister of Health Yuriy Fedorovich Isakov to tell of the results of this exposition on achievements in medicine.

Medicine today is one of the most rapidly developing sectors of science. The measures which are currently being realized for radical improvement in the quality of medical aid to the population and in strengthening the prophylactic directionality in the work of public health organs and institutions may be implemented only on the basis of scientific-technical progress. Every such exposition is an opportunity to objectively evaluate our own and the foreign level of achievements in medical science and practical application and to exchange experience in the sphere of developing medical technology and medicinal preparations. Very soon many of the most interesting displays presented by foreign companies will be seen in our hospitals, polyclinics and laboratories. Contracts with companies and enterprises of various countries have been concluded in the sum of many millions of rubles.

As concerns cooperation, with the socialist countries,it is being implemented on vital problems in current medicine on the basis of the Integrated Program adopted by CEMA in 1975 and planned for a 20 year period. There is a permanent CEMA Commission on public health which implements the realization of these plans according to target programs in the field of cardiology, oncology, reconstructive surgery and organ transplants, protection of mother's and child's health, immunology, and medical genetics. Thus, 185 joint topics are being developed in conjunction with GDR specialists, and over 50 topics in conjunction with HPR institutions. The result of joint research with Hungarian specialists has been the assimilation and practical application of over 60 new methods of diagnostics and treatment of various illnesses.

Active scientific medical ties are maintained with a number of capitalist and developing countries. The Soviet-Finnish cooperation encompasses 38 joint topics. For example, important scientific-practical results have been obtained on the prevention of lung cancer and cancer of the mammary gland. This achievement is the result of joint work by oncologists of the two countries. Cooperation with France is being actively developed in the sphere of medical genetics, biology and cell pathology on the treatment of rheumatic illnesses. For example, Soviet scientists have conducted a study of a new preparation to reduce the blood sugar level. Taking 1-2 tablets of this preparation, which was developed by pharmacologists at the French company "Servier", makes it possible for diabetes patients to feel good and to avoid certain dangerous complications of this disease. A joint symposium was held on the research materials. Its results served as the basis for the decision to build a plant on the production of this preparation in our country.

Many achievements by Soviet medical scientists have evoked great interest on the part of foreign colleagues. The Soviet foreign trade association "Medeksport" has over 400 contracting firms in 90 countries. Its export program lists over 9,000 titles of medicines, instruments and vaccines. The Soviet anti-tumoral preparation fluorafure and other substances for treating oncological illnesses, as well as preparations for treating illnesses of the cardiovascular system--etmozine, etacyzine, trinitrolong and others, are all in great demand.

Specialists of many countries are familiar with the medical apparatus of the Ilizarov system for external fixation in traumatology, laser medical devices "Yatagan" for treating glaucoma, the "Skalpel" for performing surgical operations with low blood losses and high sterility, "Yagoda" for physiotherapy using laser beams, and the original suturing apparatus AKA-2 used in operations on the intestinal tract.

The achievements of Soviet ophthalmologists, oncologists, and cardiologists have evoked great interest. A characteristic peculiarity of the achievements in the health industry presented at the exposition was the fact that this time it was not individual devices and apparatus which were exhibited, but rather complexes developed for various sectors of public health. These included a KDO-01 complex of means for pre-physician examinations used in performing mass annual check-ups; apparatus for automated collection of case history data which may question ten patients at one time, and installations for measuring the arterial pressure, body temperature and anthropometric data of six patients at once. Also exhibited were a radio-diagnostic complex, an ophthalmological complex for detecting glaucoma, and complexes for electrocardiogram study. All this very complicated equipment attracted widespread general attention.

The exhibition was held in the year of the 40th Anniversary of the Victory in the Great Patriotic War, a significant year for the Soviet people and all progressive humanity. Therefore, its slogan, "Health and peace to this and the next generation," accurately reflected the thoughts and aspirations of the Soviet people and the hopes of all the people of the planet.

12322
CSO: 1840/367

BRIEF

HEALTH CARE COMPLAINTS REVIEWED--A report on letters from readers received by the editorial office in connection with the publication of the article by B. Mozhavev entitled "Trauma" was forwarded to the USSR Ministry of Health for appropriate measures to be taken. The letters were reviewed. Minister S. P. Burenkov reported to the editorial office on this. Some patients turned to the editors with a request for help in organizing treatment or consultation at the Scientific-Research Laboratory on Metallosteosynthesis with the clinic imeni A. Seppo, the official report states in particular. The Estonian SSR Minister of Health was ordered to call the patients in for consultation to resolve the question of further treatment. According to the obtained information, four persons came and received consultation. Two were hospitalized and two were declined hospitalization due to impossibility of rendering medical aid to them at the clinic. Six letters expressed dissatisfaction with the treatment of residual effects of sustained traumas. The USSR Ministry of Health ordered the oblast and city public health departments to provide the patients with consultative and treatment aid at specialized scientific-research institutes in the republic and at traumatology sections on whose basis the medical institute departments operate. Five letters on shortcomings in the work of treatment-prophylactic institutions were reviewed by a commission at the directive of the USSR Ministry of Health. In those cases where the facts were confirmed, appropriate measures were taken for their correction. Thus, Ye. N. Kasatkina wrote of unsatisfactory medical aid rendered to her at the trauma center of Leningrad Polyclinic No 23. By directive of the Kirov Public Health Section, the head of the traumatology center at Polyclinic No 23 Mikhavlova was given a strict reprimand, and traumatology physicians Lenshtras and Babanskiy were also reprimanded. Some responses to the publication, comrade Burenkov further reported, bore the character of proposals for improving traumatology-orthopedic aid. These are being reviewed in the process of preparing the directive by the USSR Ministry of Health entitled "On Improving the Organization of Medical Aid to Patients with Traumas". [Text] [Moscow LITERATURNAYA GAZETA in Russian 12 Jun 85 p 12] 12322

CSO: 1840/366

COST EFFECTIVENESS OF HEALTH

Moscow EKONOMICHESKIYE NAUKI in Russian No 6, Jun 85 pp 115-117

SOLOV'YEV, A., professor, doctor of economic sciences and ZORIN, N., Kostroma

[Abstract] This is a review of a book by E. N. Kulagina (EKONOMICHESKAYA EFFEKTIVNOST' OKHRANY ZDOROV'YA [Cost Effectiveness of Health Care], Gorky, Volgo-Vyatskoye Kn. Izd-vo, 1984, 159 pp. Editor Ye. A. Kokorina). The book covers one of the more important aspects of health care, namely the impact of health on the national economy. It covers the USSR as a whole, with many of the examples coming from the Gorkiy Oblast. The author offers many factual details on the cost effectiveness of health care, noting that in 1980, for example, the loss in national income due to morbidity and temporary loss of work days amounted to 23.5 billion rubles (not counting expenditures for treatment). All too often, the author points out, industrial enterprises do not take into consideration the economic gain to be had in improving working conditions when adding up the expenses of instituting such changes. Briefly touched upon are the negative health effects of 'shock' work, as well as environmental and domestic factors. The treatment of these topics in both cases leaves something to be desired because of inadequate documentation. On the whole, the book is rated as a positive contribution on the national cost effectiveness of health care. Unfortunately, it was published by a local rather than a central publishing house, and in too small a print run (2000 copies) to be readily available.
[377-12172]

CAPTURED BY A PLAN

Moscow MOSKOVSKAYA PRAVDA in Russian 13 Jun 85 p 3

RUBCHENKO, I., Chief Physician of City Polyclinic # 92

[Abstract] One of the principal criterion of proper performance of a polyclinic is considered to be the fulfillment of the visit Plan. The author takes issue with this superficial approach to the practice in polyclinics, where more attention should be paid to the health aspects of the community being served, including financial rewards for the participating medical personnel. Fulfillment of the Plan is actually a restraining force in delivering health services.

The work directives and the evaluation criteria should be up-to-date, should be responsive to modern needs. Another aspect criticized is the allocation of resources to various clinics, especially those located in the older center-city sections of towns, where certain medical specialties are alloted only part-time remuneration. Centralized radiological services with good equipment and qualified personnel are recommended in contrast to presently-existing localized, ill-equipped, underserviced units.
[365-7813]

MEDICAL CARE IN BASHKIR ASSR

Moscow PRAVDA in Russian 14 Jul 85 p 3

MIRONOV, N., PRAVDA correspondent, Bashkir ASSR

[Abstract] Continuation of our 'health' expedition (PRAVDA, 11 Jul 85) on health care in the Bashkir ASSR has shown that many rural dwellers prefer treatment in Ufa rather than in their village. Recently, M. Petrov, chief physician at the Ufa Republic Hospital proudly announced that the number of rural residents coming to the hospital for medical care is steadily increasing. But is this really a good sign? Obviously, in some cases, specialized services of a city hospital are required. But the local hospitals and polyclinics in the rural areas, such as Dyurtyuli, should be quite able to handle routine cases. In a similar vein many rural residents have to go to Ufa for drugs and other medical supplies that are simply not to be had in Dyurtyuli. The reasons for such migrations are simple. The local hospitals and clinics, as well as the pharmacies have neither the facilities, nor the equipment and supplies to satisfy legitimate medical needs of the local population. The basic problems rest with inadequate planning and allocation of resources by the central authorities, who seem to regard the outlying areas as being of lesser importance.
[1965-12172]

ACADEMY OF MEDICAL SCIENCES AND MEDICAL PROGRESS

Moscow MEDITSINSKAYA GAZETA in Russian 12 Jul 85 p 3

LIKHOLITOV, V.

[Abstract] The article reports on proceedings of a meeting of the presidium of the USSR Academy of Medical Sciences (AMN SSSR) which was held on July 10. The meeting examined tasks for accelerating scientific-technical progress in public health.

Principal speakers at the meeting are identified. Summaries are given of reports by Academician N. N. Blokhin, president of AMN SSSR, and D. S. Sarkisov, chief scientific secretary of the academy's presidium; and of a

speech by S. P. Burenkov, USSR Minister of Health. Sarkisov called attention to organizational problems and trends which he said are detracting from the effectiveness of medical research. He complained in particular that many branches of present-day medicine are too narrow in focus. Medical scientists have been attracted to highly specialized research, such as the study of cells on the lowest levels, while interest in the human organism as an integral whole has slackened. Sarkisov contended that this has created a shortage of people with administrative potential who are well-informed on the status of medical science in general and on work in related fields. As a result, top-level positions at research institutes sometimes are left unfilled for months or even years. Sarkisov also criticized a recent tendency to minimize the role of the leader in research projects, and he complained that such important concepts as the scientific school, discovery and priority rights have become too lightly regarded.

Burenkov mentioned a number of immediate tasks for improving the organization, resources and technology of public health. In particular, he stressed the importance of making computer tomographs widely available, and of expanding the assortment of drugs in production.

FTD/SNAP
CSO: 1840/1996

WHO CENTER IN RIGA FOR MEDICAL INFORMATION SYSTEMS

Moscow MEDITSINSKAYA GAZETA in Russian 17 Jul 85 p 1

KORCHAGINA, V. (Riga)

[Abstract] The article reports that a center of the World Health Organization for the use of information systems in medicine has opened in Riga. It is based at the Latvian SSR Health Ministry's data processing center. The WHO center is to provide information support for a global program of health-care studies and promote the exchanging of experience among member-countries of the WHO.

A brief description is given of the public health management information system which is based in Riga. The system is said to be the largest of its kind in the USSR. It enables the republic data processing center and Central Statistical Administration to receive data from health-care and medical research facilities on a routine basis.

A. K. Krekis, director of the WHO center, said that its staff is developing and introducing new programs for management information systems, and will take part in comparative studies which the WHO is making of national achievements in the field of information systems for health services.

FTD/SNAP
CSO: 1840/1996

OFFICIAL ASSESSMENT OF MEDICAL INDUSTRY TECHNOLOGY AND PRODUCTS

Moscow MEDITSINSKAYA GAZETA in Russian 17 Jul 85 p 2

[No author given]

[Abstract] The article reports on proceedings of a recent conference of workers of the medical industry, which was devoted to questions of promoting scientific-technical progress in the industry.

A report given by A. K. Mel'nichenko, Minister of the Medical Industry, and addresses by officials of industrial, scientific and Party organizations are summarized. They assessed progress in modernizing enterprises and improving their performance and products. It was reported that work is being expanded on development of medical equipment using microprocessor control and information-processing systems. A more intensive search is planned for highly effective drugs and immunodiagnostic agents for infectious diseases.

Participants in the conference noted that some of the industry's products are not up to the standard of the best world achievements. The work of the industry's R&D organizations was criticized in this connection. L. G. Seleznev, chief engineer of the "Oktyabr'" Chemical-Pharmaceutical Production Association in Leningrad, and other speakers criticized the quality of equipment available to the medical industry. Seleznev called for an accelerated buildup of the industry's own resources for developing and producing industrial equipment. Representatives of the quality assurance department of the "Sintez" medical preparations and products complex in Kurgan called upon research institutes of the industry to develop simpler, faster and more precise methods and equipment for monitoring the quality of products. They called for the development of a new component base for medical instruments, which will require corresponding training of design and production engineers.

S. P. Burenkov, USSR Minister of Health, was among the other speakers at the conference.

FTD/SNAP
CSO: 1840/1996

MOSCOW CARDIOLOGY CONFERENCE

Moscow PRAVDA in Russian 25 Jun 85 p 4

[TASS Report: "Cardiologists Forum"]

[Excerpts] An international conference on preventive cardiology organized by the All-Union Scientific Society of Cardiologists opened in Moscow 23 June. [passage omitted]

The participants in the conference greeted with applause the welcoming message from the USSR Council of Ministers which was read by G. A. Aliyev, member of the CPSU Central Committee Politburo and first deputy chairman of the USSR Council of Ministers.

Academician Ye. I. Chazov, chairman of the organizing committee; H. Mahler, director general of the WHO; (K. Piorala), president of the International Society and Federation of Cardiology; and (Dzh. Asvall), director of the WHO Regional Bureau for Europe, spoke at the opening of the conference about the importance of uniting medical workers, their growing social responsibility at the present stage, and the vanguard role of cardiology.

CSO: 1840/1966-F

BRIEFS

INTERNATIONAL COURSE ON FOODSTUFF CONTAMINATION--(Armenpress)--International courses for specialists on evaluating the pollution of food products with mycotoxins have begun in Yerevan. Representatives from Vietnam, Cuba, Laos, Ethiopia, Benin, Bolivia, Brazil, Gambia, Zambia, YAR, PRC, Nepal, Sudan, Sri Lanka and Ecuador participated. The courses are being conducted by the Center of International Projects of the USSR State Committee on Science and Technology under the auspices of the UN environmental program (UNEP), the UN food and agricultural organization (FAO), and the USSR Commission on UNEP Affairs. The students will hear lectures presented by leading scientists and specialists from a number of world countries on various problems of mycotoxicology--the science of strong toxins excreted by microscopic fungi which may affect food products. The courses are based at the Armenian Branch of the All-Union Scientific-Research Institute on Hygiene and Toxicology of Pesticides, Polymers and Plastics. The participants were greeted by the chief state public health physician of the Armenian SSR and the republic's Deputy Minister of Health, U. Pogosyan. Scientific reports were presented by the director of the branch, Doctor of Medical Sciences and Professor K. Nazartyan, who heads the botany department at Yerevan State University, as well as by Doctor of Biological Sciences, Professor L. Osipyan. In her discussion with our Armenpress correspondent, the director of the international project of FAO-UNEP-USSR entitled "Evaluating the Pollution of Food Products by Mycotoxins" under the USSR GKNT [Council of Ministers State Committee on Science and Technology] Center for International Projects, Candidate of Chemical Sciences O. Doronina said, "International courses on mycotoxicology are very current". "The interest of specialists in various fields of biology, medicine, agriculture and the food industry in this problem is determined by the real danger which mycotoxins pose to human health, by the widespread distribution of their sources in nature, and by the significant scope of economic loss which they inflict." The meeting in Yerevan will aid in the dissemination of information and the generalization of experience of many countries in this sphere and will help in the organization of a system of control over pollution of foodstuff raw materials by mycotoxins. [Text] [Yerevan KOMMUNIST in Russian 15 Jun 85 p 3] 12322

UZBEK PUBLIC HEALTH CONFERENCE--(UzTAG)--"Methodico-Biological Problems of Public Health" was the topic of the joint scientific conference of the UzSSR Academy of Sciences and Ministry of Health, which was held on 18 June in Tashkent. Its participants discussed questions of the development of fundamental and applied research. It was noted that the scientific institutions and VUZes in Uzbekistan are actively participating in the development of long-term comprehensive programs of the USSR Academy of Sciences such as "Brain, "Ion

Channels", "Homeostasis", and others directed toward the study of cardinal problems in physiology and medicine. The meeting participants gave particular attention to problems which have not yet been solved, stressing the fact that the laboratories on medical-biological research are still poorly equipped with modern instruments. Training and re-training of the medical cadres must also be improved. The immediate practical introduction of results of the fundamental sciences is currently taking on primary importance. [Text] [Tashkent PRAVDA VOSTOKA in Russian 19 Jun 85 p 1] 12322

ECOLOGICALLY CLEAN CROP PROTECTION--(ATEM)--The symposium which opened on 29 May in Kishinev was devoted to problems of an ecologically pure method for protecting crops against various pests. Its participants--representatives from the PRB, HPR, GDR, PPR, SRR, USSR and CzSSR--were members of the east-palearctic section of the International Organization for Biological Warfare Against Harmful Animals and Plants (MOBB). They presented the results of the latest research for the purpose of their widespread practical application. It was noted at the symposium that the primary direction in the work of scientists is the classical biological method of plant protection--the introduction and acclimatization of beneficial insects in various zoogeographical zones. This method has yielded the best results in terms of effectiveness in suppressing certain species of pests to agricultural cultures under hothouse conditions in a number of socialist countries. Biological methods for combatting various pests to crops have been developed and recommended for introduction, and good results have been obtained in the propagation of natural enemies for many insects which destroy vegetable crops. The symposium participants will outline further means of cooperation in joint research. [Text] [Kishinev SOVETSKAYA MOLDAVIYA in Russian 30 May 85 p 3] 12322

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FOURTH SOVIET-ITALIAN SYMPOSIUM 'MACROMOLECULES IN FUNCTIONING CELLS'

Kiev BIOPOLIMERY I KLETKA in Russian Vol 1, No 1, Jan-Feb 85 pp 48-50

PLATONOV, O. M.

[Abstract] The fourth symposium organized under the aegis of the bilateral agreement between the USSR Academy of Sciences and Italian Center of National Studies was held 4-10 Jul 84 in Kiev. The previous symposia were held on the Isle of Capri (1978), in Pushchino (1980) and in Siena (1982). The two cochairmen were Academician A. A. Bayev (Secretary of the Division of Biochemistry, Biophysics and Chemistry of Physiologically Active Compounds, USSR Academy of Sciences) and Professor A. Ruffo (Director of the Institute of Bioorganic Chemistry, corresponding member of National Academy). Over 90 Soviet and 14 Italian scientists participated. The program of this symposium included the following subjects: molecular enzymology, structure and evolution of proteins; molecular organization and functioning of membranes; biosynthesis of protein and its regulation; molecular biology of genes, genetic engineering; oncogenesis and mutagenesis problems; structural organization and functioning of genome. There were nine formal sessions with 42 papers and 3 poster sessions with 52 reports.
[1957-7813]

MISCELLANEOUS

INTERNATIONAL MEDICAL SYMPOSIUM ON NUCLEAR WAR CONSEQUENCES

Moscow MEDITSINSKAYA GAZETA in Russian 26 Jun 85 p 1

DEMYANKOVA, I. and ZOLOTOVA, L.

[Abstract] The article reports on proceedings of an international symposium. "The Role of Physicians in Preventing Nuclear War", which was held recently in Moscow. Prominent medical scientists from socialist-bloc countries, the United States, Japan, Great Britain and other countries attended the symposium.

A number of the principal speakers are identified, and brief summaries of their reports and papers are given. The symposium was opened by Academician Ye. I. Chazov, G. Golitsyn, corresponding member of the USSR Academy of Sciences, spoke on long-range consequences of nuclear war, including 'nuclear winter'. L. I.El'yin, member of the USSR Academy of Medical Sciences, reported on results of research which he and J. Rotblatt, a British scientist, conducted independently as experts of the World Health Organization. Studying the consequences of a hypothetical nuclear strike with a power of 10,000 megatons, the two scientists concluded that a total nuclear war would result in the death of 2.245 to 2.500 billion people.

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October 2, 1985